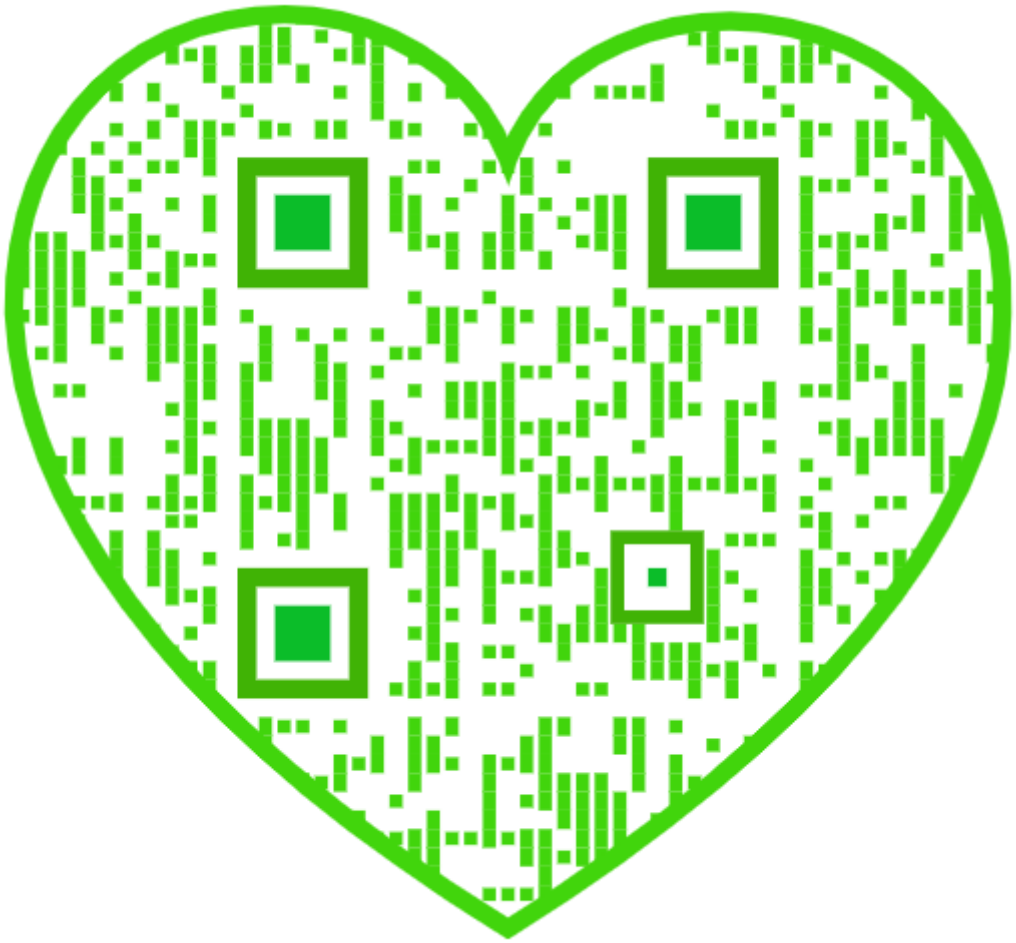

A

DICTIONARY

OF

PRACTICAL MEDICINE:

COMPRISING

GENERAL PATHOLOGY,

THE NATURE AND TREATMENT OF DISEASES, MORBID STRUCTURES, AND THE DISORDERS ESPECIALLY INCIDENTAL TO CLIMATES, TO THE SEX, AND TO THE DIFFERENT EPOCHS OF LIFE;

WITH

NUMEROUS PRESCRIPTIONS FOR THE MEDICINES RECOMMENDED

A CLASSIFICATION OF DISEASES ACCORDING TO PATHOLOGICAL PRINCIPLES, A COPIOUS BIBLIOGRAPHY, WITH REFERENCES;

AND AN

Appendix of Approved Formulae:

THE WHOLE FORMING A LIBRARY OF PATHOLOGY AND PRACTICAL MEDICINE, AND A DIGEST OF MEDICAL LITERATURE.

BY JAMES COPLAND, M.D.

Consulting Physician to Queen Charlotte's Lying-in Hospital; Senior Physician to the Royal Infirmary for Diseases of Children; Member of the Royal College of Physicians, London; Member of the Medical and Chirurgical Societies of London and Berlin, etc.

EDITED, WITH ADDITIONS,

BY CHARLES A. LEE, M.D.

VOL. IV.

NEW-YORK:

HARPER & BROTHERS, PUBLISHERS,

82 CLIFF STREET.

1845.

BOSTON MEDICAL LIBRARY
IN THE
FRANCIS A. COUNTWAY
LIBRARY OF MEDICINE

Entered, according to Act of Congress, in the year 1846, by

HARPER & BROTHERS,

In the Clerk's Office of the Southern District of New-York.

CONTENTS.

	Page
HEARING—Deafness from Diseases of the Eustachian Tube, &c.	185
Remedies for	191
Bibliography and References	192
HEART AND PERICARDIUM—Diseases of	193
General View of	197
Nervous or Functional Affections	203
Neuralgic Affections of the	207
Inflammations of	208
Inflammation of the Endocardium	209
—— Pericardium	214
Symptoms and Diagnosis	218
Inflammation of the Structure of the Heart	220
Treatment of	229
Bibliography and References	234
Structural Lesions of the Heart, &c.	235
Hypertrophy	237
Dilatation of its Chambers	244
Atrophy of	248
Ruptures of	257
Bibliography and References	262
HERPETIC ERUPTIONS	267
Treatment	270
HICCOUGH—Description, Causes, &c.	271
HOOPING-COUGH—Description	273
Nature and Seat of	279
Prognosis, Causes, and Treatment	283
HYDATIDS—Description, &c.	293
Symptoms and Treatment	297
HYPERTROPHY—General Pathology, &c.	298
HYPOCHONDRIASIS — Description, &c.	301
Duration—Lesions of Structure, &c.	303
Causes, Pathology, &c.	305
Treatment	308
HYSTERIA—Various Forms of	314
Duration and Termination	323
Causes—Pathology	325
General Treatment	330
Bibliography and References	340
JAUNDICE—Pathology—Symptoms	341
Causes—Morbid Appearances	343
Treatment	353
Bibliography and References	359
ICHTHYOSIS—Diagnosis	361
IMPETIGINOUS AFFECTIONS—Description	363
Prognosis—Causes—Treatment	367
IMPOTENCE AND STERILITY	369
In the Male	370
—— Female	373
Treatment	374
Bibliography and References	376
INDIGESTION—Pathology	377
Causes of, and Symptoms	380
Treatment	388
Diet and Regimen	393
Bibliography and References	398
INDURATION—Treatment	400
INFECTION — Pathology — Classification	401
Sources of	404
Media of	409
Symptoms of	413
Protection from	417
Bibliography and References	423
INFLAMMATION—Phenomena of	426
Colour of the Blood, &c.	431
Terminations and Consequences	436
Various Modifications	438
Diagnosis	447
Exciting Causes	450
Prognosis	455
Opinions concerning	457
Pathology	462
Treatment	472
Bibliography and References	487
INFLUENZA—History of	489
Symptoms of	492
Progress—Diagnosis	495
Causes	496
Treatment	498
Bibliography and References	499
INSANITY—Definition	500
Symptoms of	502
Classifications	510
Melancholic Monomania	521
Dementia	530
Complications of	534
Terminations of	537
Predisposing Causes	555
Physiological Pathology of	573
Treatment	590

not necessarily weaken the hearing." Now this is not altogether just; for M. Itard contends that, when the opening is small, the hearing in some cases is not materially impaired, although in the great majority it is more or less so; but that when it is considerable, or when a large portion of the membrane is destroyed or detached, hearing is always very much injured. Although perforation of the membrane causes deafness, yet there are states of the ear, and even of the membrane itself, in which *artificial perforation* of it may be attended by some benefit. Such states are, however, few, and the instances of success from the operation have been rare or equivocal.

15. *Artificial perforation* of the membrane was first performed by Sir A. Cooper many years since; but the circumstances requiring the operation were not fully understood until explained by Deleau and Kramer. The latter of these writers remarks that Sir A. Cooper supposed perforation of the membrane to be indicated chiefly in cases of obstruction of the Eustachian tube, and in extravasation of blood in the cavity of the tympanum; but, as he appears to have been unacquainted with catheterism of this tube, his diagnosis of the closure of it was altogether uncertain. Even supposing these morbid states actually to exist, they may be treated more efficiently by introducing the catheter into the tube itself than by perforating the membrane. Itard contends that the operation is admissible only when there is invincible obstruction in the tube; Saissy advises it only in thickening and hardening of the membrane; and Deleau recommends it also in this case, as well as in obstruction or obliteration of the Eustachian tube, and in obstruction of the cavity of the tympanum. Dr. Kramer has recourse to the operation only when the *membrana tympani* is much thickened, quite insensible to the probe, hard as cartilage, and if the hearing is very much impaired; but even in this case it should be performed only when both ears are affected with considerable deafness, and when the ear to be operated upon does not suffer from any other disease by which the result might be rendered abortive.

[Pilcher (*loc. cit.*) thinks that this operation is justifiable only in cases of invincible stricture of the Eustachian tube. It was first suggested by Riolanus. When the operation is indicated, it may readily be performed by directing a strong light upon the membrane, which is then to be perforated at the lower part, anterior to the inferior extremity of the manubrium of the malleus, by a small perforator having a sharpened point extending two or three lines beyond the shoulder. On account of the readiness with which the wound heals, Mr. Buchanan recommends a quadrangular perforator, which makes a larger opening; and Henly has introduced a small punch which cuts out a small piece. The same instrument has been recommended by Dr. Gibson, of Philadelphia. One serious inconvenience attending this operation is the liability to hæmorrhage into the tympanal cavity, the blood becoming organized, and thus causing deafness.]

16. II. Deafness from Disease of the Eustachian Tube and Cavity of the Tympanum.—i. *Affections of the tube.*—The Eustachian tube may be obstructed, 1st. By the pressure of tumours in its vicinity; 2d. By inflammation causing tumefaction of the mucous membrane, effusion, &c.; and, 3d. By the more remote consequences of inflammation, namely, constriction or obliteration of a portion, or of the whole of the canal. Before, however, any of these can be accurately ascertained, it is necessary to have recourse to means of exploration similar to those employed in obstructions of some other canals. The introduction of tubes or catheters into the canal, in order to ascertain the nature of, and to remedy various affections both of it and of the cavity of the tympanum, has been resorted to by Sabatier, Wathen, Douglas, Saissy, Itard, and others. Through this tube lukewarm water was sometimes injected by these writers, in order to judge of the state of the middle ear, according to the sensations produced by it, or by the total absence of sensation. Deleau and Kramer, however, rejected the use of water as an injection, and adopted the suggestion of Cleland, to employ air instead of water in the investigation and treatment of diseases of the tube and cavity of the tympanum. Dr. Kramer recommends the usual silver inflexible catheters to be used; and air, compressed in an apparatus, he describes to be injected through it in the following manner: "After the catheter has been introduced into the tube, and fixed by means of a frontlet, the patient is placed close to a table, on which he leans his elbow, holding with the hand of that side the pipe of the air-press filled with compressed air. The operator then introduces the metal beak of the pipe into the funnel-shaped dilatation of the catheter, applies his ear close to that which is being examined, opens the cock of the machine, and listens to the sound caused by the air rushing into the cavity of the drum. When the tube and cavity are free the air strikes with an audible shock against the membrane of the tympanum. When the shock is over, or is slight, a blowing or rustling in the ear of the patient is heard, caused by the streaming of the air." All variations from this sound are morbid, and furnish more or less distinct indications of diseased changes in the organ. If the air-douche does not penetrate to the *membrana tympani*, Dr. Kramer advises catgut bougies to be used for opening the passage in the tube.

[The accidents which sometimes occur in consequence of catheterism of the Eustachian tube, and injections of air into the middle ear, are described by M. Deleau under the following heads: 1. Inflammation of the throat, and catarrh of the tympanum; 2. Emphysema; 3. Rupture of the membrana tympani. Emphysema has occurred to Deleau six or seven times. Several deaths have been recorded in the London medical journals within a year or two past from the pumping of air from a press into the Eustachian tube. It has been suggested by Pilcher (*loc. cit*) that this happened from the passage of air into the larynx by the catheter taking a wrong direction, and not having penetrated at all into the tube. See "*Clinical Observations, by* Mr. Wharton Jones, *on the Use of the Air-douche in the Diagnosis and Treatment of Diseases of the Ear*," Lond. Med. Gaz., 1839, and Am. Ed. of Pilcher, *on the Ear*, p. 260. Mr. Wharton Jones recommends the injection of the vapours of acetic æther, or ethe-

real vapour, into the Eustachian tube, as well calculated to benefit cases of deafness owing, according to Kramer, to nervous deafness, but which he believes to depend frequently on some change in the membrane lining the tympanum. The fact is, that we are as yet but little acquainted with the diseases of the labyrinth, and it will be safer to employ, either before or in addition to local treatment, purgatives, leeches, blistering, or whatever other more general remedies may be indicated. Mr. Kramer remarks, that out of 300 cases of diseases of the ear of all kinds, 200 require the air-douche to assist the diagnosis; but that about 30 only are curable by it; of the remaining 170, about 30 are put down as cured, and about 50 as relieved by the injection of vapours of acetic æther; this treatment having been continued for months, of the remainder, 80 were considered as incurable from the first, and not treated; the rest remained unaffected by treatment. Deafness is, in some cases, relieved by forcible expirations with the nose and mouth closed, which drives the air into the internal ear through the Eustachian tube, and a case of cure is related int he "*Mem. of the Med. Soc. of London*," of over a year's standing, by this procedure.]

17. *A. Inflammation of the mucous membrane of the Eustachian tube* occasions modified or different results, according to the intensity of the morbid action, and the degree in which adjoining parts participate in the disease.—*a. Catarrhal inflammation*, or irritation of the tube, with accumulation of mucus obstructing it, is a not infrequent attendant upon catarrhal complaints, upon inflammations of the throat or fauces, and upon eruptive fevers, the deafness sometimes accompanying these diseases arising from this affection of the tube. It is most common in moist, cold localities and climates, near the seacoast, and in foggy weather. The *Treatment* should be directed to the removal of the primary disorder, especially the affection of the throat. If the deafness still continue, astringent gargles containing the biborate of soda, or the nitrate of potash, or the hydrochlorate of ammonia, or gargles with the decoction and tincture of bark and hydrochloric acid, or the internal use of iodine, may be of service. Aqueous injections into the guttural orifice of the Eustachian tube have been advised by Saissy, Itard, and others; but Deleau and Kramer prefer the air-douche just described, notwithstanding the good effects of these.

18. *b. Deafness from inflammation of the mucous membrane of the tube* may proceed from disease of the throat, or of the proper membrane of the drum, and be complicated with either, or with both these diseases. In the case of its connexion with lesion in the cavity of the tympanum, it is either associated with, or has followed acute *otitis* or *otorrhœa*; but when the inflammation is confined to the guttural part of the canal, deafness is neither great nor attended by pain in the interior of the ear. The patient hears well at times, but only momentarily. He hears his own voice even worse than that of others, and occasionally has a crackling, gurgling, or detonating sensation in the throat leading to the ear. The diagnosis is still more to be depended upon if pain or inflammation exists in the throat or fauces, and if the former be increased on gaping or mastication. The chronic states of this disease of the tube are generally connected with syphilis, or with the scrofulous diathesis.

19. *c.* The *Treatment* of the more acute states of inflammation of the tube should be entirely antiphlogistic. Local vascular depletions; active purgatives, especially calomel with antimony; cooling and detergent gargles, particularly those with the biborate of soda, or nitre, or hydrochlorate of ammonia, external derivatives, or the warm or vapour bath, and diaphoretics, are generally required. After vascular depletion, an emetic is sometimes of service; but, as this disease most frequently is consequent upon, or complicated with an affection of the throat or ear, or occurs in the course of exanthematous fevers, the treatment of it must necessarily depend very much upon the nature and state of the primary or associated malady. When the disease of the tube is chronic, or consequent upon venereal affections of the throat, mercurials, especially the *bichloride of mercury*, gargles containing this substance, or the internal use of *iodide of mercury*, should be resorted to. In the scrofulous diathesis, the preparations of *iodine* may be tried. In protracted or severe cases, especially when connected with ulceration in the throat, or syphilis, or scrofula, treatment is seldom successful, as they have very frequently gone on to the states next to be noticed.

20. *d.* When the inflammation, either from its protracted continuance, or from its extension to the connecting submucous cellular tissue of the tube, gives rise to *thickening of the mucous membrane*, or to *ulceration*, more or less *complete occlusion*, or *stricture*, or even *obliteration of the canal*, may result, especially when an ulcer is seated near the orifice of the tube, and afterward cicatrizes, as in cases of malignant angina, or of venereal ulceration of the throat. It is important to distinguish these lesions from those states of disease which admit of satisfactory treatment. This is to be done chiefly by ascertaining the history of the case. If the deafness have followed severe affections of the throat, especially that occurring in connexion with malignant eruptive diseases, with syphilis, or with scrofula; if it have continued long, been constant and uninterrupted; and if it have followed severe *otitis* or purulent *otorrhœa* (see art. Ear, § 10, 18), it may be inferred that one or other of the lesions just specified exists. If there be any doubt entertained, recourse to the means of exploration advised by Itard, namely, by forcing water into the tube, or to that employed by Deleau and Kramer, and described above (§ 16), will establish the diagnosis.

21. Perforation of the membrane of the tympanum has been resorted to by Itard in cases of this kind, but with very equivocal success. Dr. Kramer states that he has found them incurable, and that this operation has been of no use in them, as the mucous membrane of the cavity of the tympanum is also diseased. The introduction of catgut bougies into the Eustachian tube has not been productive of any permanent benefit. If obliteration of the canal be complete, the cavity of the drum is always involved in the disease; and *à fortiori*, perforation of the membrana tympani, advised by some writers, can be of no avail.

[Many cases of what have been generally regarded as incurable strictures of the Eustachian tube will, according to Pilcher (*loc. cit.*), yield to cautious and regular dilatation. When Sir Astley Cooper introduced his operation of puncturing the membrane of the tympanum, he was not aware of this procedure; and Pilcher observes, that "no doubt can exist that, in many instances in which the membrane was punctured, and in several which this distinguished surgeon has related, the obstruction might have been removed, and particularly in cases where there is a collection of mucus or blood in the cavity, which may be more easily syringed out with warm water through the tube than removed through an artificial opening in the membrane." *Catheterism* of the tube is useful, 1st. As an important means of investigating its condition of health or disease, and that of the tympanum; 2d. To remove mucus or blood from the tympanal cavity; 3d. To dilate a stricture of the tube; and, 4th. To stimulate the nervous system of the ear in cases of diminished function.]

22. *c. Deafness may depend upon the occlusion of the Eustachian tube by tumours pressing upon its guttural extremity.*—Enlarged tonsils are the most common cause of this form of deafness; but polypous or fungous excrescences, and enlarged parotids also, not infrequently produce it. In either case, the diagnosis is very easy, and the indications of cure sufficiently manifest. Polypi must be removed by excision or ligature whenever either can be performed. When the tonsils are enlarged, scarifications, astringent and detergent gargles, stomachic purgatives and tonics, the preparations of iodine, and the other means of cure directed for *enlargement of the* Tonsils (see the article), should be prescribed. If the tonsils contain matter, the puncture or incision of them ought not to be delayed. Enlarged parotids, if the affection be chronic, may be treated with iodine, &c.

[Our author has, perhaps, not dwelt sufficiently on the importance of constitutional treatment in cases of chronic inflammation of the Eustachian tube. We often find, in connexion with these cases, a relaxed uvula, enlarged tonsils, a red tongue, enlargement of the glands of the neck, thickening of the lining membrane of the Eustachian tube, an irritable state of the lining membrane of the nostrils, and of the mucous membranes generally; in short, all the symptoms that characterize the strumous habit. Local treatment will not alone prove sufficient here: we must have recourse to blue pill, the iodides, sarsaparilla, soda, with rhubarb, gentian, columbo, and other tonics. We must endeavour, in other words, by constitutional treatment, to impart new energy and a healthy action to the entire mucous system.]

23. *B. Inflammation of the cavity of the Tympanum.*—The inflammation may affect only the mucous membrane lining this cavity, or it may extend to the submucous cellular tissue, and even to the periosteum. It is generally either acute or chronic, and, in either case, is a severe and often dangerous disease. The symptoms, consequent lesions, and the treatment of this disease in its various forms, are fully described in the article Ear (see § 14, *et seq.*). As deafness resulting from *purulent otorrhœa*, with perforation of the membrane of the tympanum, or from *disjunction or loss of the small bones of the ear*, or from *caries of the osseous structure*, belong to the more chronic states of *otitis*, and is discussed in the article just referred to (art. Ear, § 19, *et seq.*, and 28, *et seq.*), it is unnecessary to recur to the subject at this place.

24. *C. Deafness may arise from extravasation of blood in the cavity of the drum.*—This lesion is usually the result of external injury, of violent attacks of sneezing, or of constriction of the neck, but it is chiefly caused by the first of these. In cases of this kind, Sir A. Cooper advised perforation of the membrane; but the extravasated fluid will either pass off by the Eustachian tube, or be absorbed. Moreover, the deafness and other unfavourable symptoms existing in these cases are not so much dependant upon the extravasation in the cavity of the ear as upon the injury other parts of the organ, or even the brain and its membranes, may have sustained. When, however, blood is effused in the drum, inflammatory action not infrequently supervenes.

25. III. Deafness from Affections of the Auditory Nerves — *Nervous Deafness.* — We can seldom arrive at just conclusions respecting deafness from this cause derived from direct phenomena. We can infer it only from the absence of those deviations from the healthy state that have already passed under consideration. When, in connexion with the absence of these lesions, ascertained by a minute examination, and by having recourse to the air-douche, there are indications of disease within the cranium, or of some other malady with which the organ of hearing may be presumed to sympathize, then the existence of deafness from an affection of the auditory nerves may be considered as probable. In such cases there is impaired or lost hearing, without any organic deviation in the ear, the lesion being either in the nerves, in their expansions in the labyrinth, or in their course thither, or in the brain at or near their origins. It is always difficult, frequently impossible, to determine the situation of the lesion, and still more so to ascertain whether the lesion consist of simply impaired or lost function of the nerves, or of interrupted action, owing to extraneous influences or morbid productions in their vicinity. In all cases, however, the absence of organic change in the ear itself should be previously made out. Dr. Kramer states that most writers on the diseases of the ear—that Saunders, Swan, Lentin, Beck, Vering, J. Frank, and Saissy—have been incapable of determining this preliminary part of the investigation; that Curtis, Stevenson, and Wright are still worse authorities, and that Itard and Deleau are alone deserving of any confidence. Having consulted with M. Itard, and frequently referred to his writings, I can bear testimony to his science and candour, and to the great value of his contributions to this department of medical knowledge.

26. Dr. Kramer, with much of the spirit of the craft, but also with the science of the physician, severely criticises the writings of his contemporaries; rejects the distinctions of Itard, which, however, appear to be more scientific and correct than his own; and proposes

a novel division of nervous deafness, and a new mode of treatment. He divides it into two forms, the one attended by excitement or erethism, the other by torpor. Noise in the ears is always present in the former, but never in the latter. This symptom is often, however, attendant on very different diseases of the ear, but in a very indeterminate and inconstant manner. To determine, therefore, whether deafness, with noises in the ear, proceeds from disease in the organ, or from nervous affection merely, minute investigation, and the means of diagnosis already mentioned, must be had recourse to. But these are also requisite in the torpid form of nervous deafness. Mr. Swan believes that many cases usually imputed to palsy of the auditory nerve are occasioned by chronic thickening of the membrane lining the cavity of the tympanum, involving the small branches of nerves in this situation. This is not improbable; and, admitting it to obtain, Dr. Kramer's mode of diagnosis will not always succeed, nor determine the existence or absence of true nervous deafness. On this subject, the views of M. Itard are more pathological, and less empirical than those of Dr. Kramer; and therefore, in the few observations I have still to offer, I shall chiefly follow him.

27. *A. Deafness may proceed from compression of the auditory nerve.*—In most instances, however, this source of the affection cannot be accurately determined. A tumour may be developed, or purulent formations or extravasated blood may exist in the course, or in the vicinity, or near the origin of the seventh pair of nerves, interrupting the passage of impressions made on the organ to the sensorium; but this condition often can be only surmised. Duverney and Sandifort found these nerves pressed upon by tumours, and Severinus observed them surrounded by serum and effused blood. If the tumour or morbid collection be considerable, then the extension of paralysis to the nerves of vision and of smell may favour the conjecture. Bonet mentions a case in which hearing and sight were lost, and on dissection a tumour was found pressing on the nerves of these senses. Thomann records a similar instance to this. Itard found in a man who had lost the hearing in the left ear small tumours lying on the corresponding side of the cerebellum, and nearly two ounces of a thick fluid in the ventricle of the same side. In cases adduced by Lieutaud, in several detailed by Lallemand, and in some seen by myself, an abscess had formed in the part of the brain adjoining the ear, and, by pressure or consequent disorganization, had destroyed the functions of the auditory nerve. (See article Ear, § 21, *et seq.*)

28. *a.* The *Symptoms* of deafness from compression of the nerve of hearing are, severe and nearly constant headache, vertigo, noise in the ears, impaired sight, and weakness of the mental faculties, especially of the memory. The progress of this affection is generally very slow, although the internal disease producing it is ultimately fatal. In several instances mentioned by Itard, it continued some years without materially affecting the general health. In two instances the above symptoms continued upward of fifteen years. I also have known cases nearly as long protracted as these. The case is most protracted when it proceeds from a tumour or morbid growth within the cranium.

29. *B. Deafness from Palsy of the Acoustic Nerve.*—M. Itard supposes that this nerve may be paralyzed (*a*) by a severe shock or commotion, (*b*) by convulsions, (*c*) by apoplexy, (*d*) by fever, and (*e*) from sympathy with some other organ. Without denying the possibility of these causes giving rise to palsy of the nerves of hearing, and even admitting that apoplexy or convulsions and fever will sometimes occasion it, yet the others may seem problematical.—*a.* It is probable that very loud noises, as a clap of thunder, or the explosions of artillery, may paralyze these nerves, especially as deafness from these and similar causes can be explained only after this manner, when symptoms of inflammation or of congestion of the ear, or of the brain cannot be detected. M. Itard believes that the shock occasioned by falls in the lower parts of the body, or the counter-stroke occasioned in this and other ways, also may paralyze the auditory nerves; but this cause seems more doubtful than the preceding. When deafness has been occasioned by loud noises, hearing often returns spontaneously in a few days or weeks; but if the deafness persists for some months, it is rarely removed by treatment.

30. *b.* Deafness sometimes follows *convulsions.* This is most frequently observed in children under four or five years of age. Many of the cases of deaf-dumbness originate in the convulsions occurring during the first dentition. But the deafness may not be the result of the convulsions, both the one and the other more probably being produced by some lesion at the origin of the acoustic nerves, or by effusion into the fourth ventricle, or by some change at the base of the brain, or about the medulla oblongata. When the loss of hearing is complicated with palsy of one side, or of one limb, the nature of the affection may be inferred; but when this is not the case, and when hearing in both ears is lost, the exact nature or seat of lesion can seldom be determined, or even surmised. M. Itard considers deafness occurring in this manner as quite incurable.

31. *c. Deafness from apoplexy* is a frequent occurrence, and may exist in one or both ears. When hemiplegia has followed the apoplectic attack, the deafness is generally on the same side, and is then incurable; but when the patient is not far advanced in years, and when there has been no consecutive palsy, the affection of hearing may be somewhat ameliorated by the sole efforts of nature, or by the means about to be mentioned; but more frequently, especially in old persons, no advantage accrues to the hearing from treatment. When deafness occurs early in *typhoid* and *infectious fevers*, it frequently continues after recovery from them. If a judicious application of remedies do not succeed in a reasonable time, and if the affection have been of long continuance, hearing is very rarely recovered.

32. *B. Treatment.*—When the deafness following these diseases is incomplete, and occurs in young persons, then blisters applied behind the ears, or moxas in the same situation; the vapour of æther, or of camphor; the in-

ternal use of stimulants, when there is no tendency to cerebral plethora; and the use of stomachic purgatives and alteratives, to promote the secreting and excreting functions, may be resorted to; but recovery of hearing, in these cases, may proceed as much from spontaneous changes in the circulation within the head, and in the state of nervous power, as from the remedies prescribed. (See, also, § 37.)

33. *d. Deafness is sometimes symptomatic of, or associated with disorders of the digestive organs.*—In these cases, the affection is generally slight; but it is sometimes very considerable and difficult of removal. Impaired and disordered digestion, deranged biliary secretion and excretion, a foul or loaded tongue, tumid abdomen, a morbid state of the evacuations, and an unhealthy aspect of the countenance and of the general surface, generally characterize this form of deafness. The *treatment* consists chiefly in the exhibition of emetics, followed by stomachic purgatives, and in attention to diet and regimen. The purgatives should be often repeated, and sometimes even the emetics ought to be given from time to time. After the secretions and excretions have somewhat improved, tonics and deobstruents, and the preparations of iron may be prescribed, and be aided by blisters, or moxas applied behind the ears. The disorder of the digestive organs, associated with deafness, is sometimes also connected with *difficult dentition*, as justly remarked by Nuck, Hesse, and Itard; and occasionally the impaired digestive, assimilating, and excreting functions, of which deafness is symptomatic, gives also rise to the production of *intestinal worms*. In these circumstances, the indications of cure are manifest. (See Dentition—*Difficult*; and Worms—*Intestinal*.)

34. *c. Idiopathic Paralysis of the Acoustic Nerves.*—This affection has been defined by Itard to be a want of excitability in these nerves—a loss of their sensibility, independently of the circumstances or causes already passed in review. Its existence has been unjustly doubted by Dr. Kramer. M. Itard believes, however, that it may be congenital, or supervene at any period of life; but that it most frequently occurs after forty. It is often accompanied with headache, noise in the ears, and mental inaction. Numbness, or want of sensation in the external ear, is sometimes present. M. Itard has seen the organic sensibility of this part entirely lost in two instances. In old persons, this symptom is often observed in slighter degrees, and is attended by dryness of the meatus. This variety of deafness is generally ameliorated by warm or mild weather, and by loud noises; but, as soon as these cease, the affection returns to its former state. It is *caused*, as well as aggravated by mental exertion and fatigue; by masturbation, venereal excesses, and other depressants; by exposure to cold, currents of air, and humidity, and by the depressing passions. Its accession is imperceptible, and its progress very slow. Sometimes it continues long stationary; but it is little influenced by treatment. If the patient, however, be not far advanced in life, some advantage may be derived from blisters applied behind the ears, or from moxas, rubefacients, or stimulants around the organ, and repeated from time to time; from the vapour of æther, or of camphor conveyed into the meatus or into the Eustachian tube; from tonics, with serpentaria, or arnica, and from the preparations of iron. Electricity and galvanism have been employed in this variety, but with little or no permanent benefit.

35. *f.* Deafness, in its more complete states, may also proceed from *organic changes in the acoustic nerves*. Sylvius found them, on dissection, remarkably atrophied: a state probably consequent upon prolonged inaction. Ackermann observed them indurated; and Morgagni states that, in one case, they were entirely wanting.

[Mr. Yearsley maintains* that nervous deafness is a very rare disease; that is to say, that the loss of hearing, from torpor or inactivity of the auditory nerve, unconnected with organic disease in the different parts of the external, middle, and internal ear, is extremely unfrequent, and that a large majority of cases, usually called nervous deafness, are, in reality, dependant on a diseased state of the mucous membrane of the internal ear. He states that, in 120 cases of dissections of deaf cases, the aural mucous membrane was diseased in no less than 91 cases, or upward of three fourths of the number examined. Mr. Y. dwells emphatically on the frequency with which inflammation extends along the nasal cavities, the tonsils, fauces, and throat, through the Eustachian tube, to the internal ear, thus giving rise to a thickened state of its mucous lining membrane, and, consequently, to deafness, as in epidemic catarrh, the exanthematous affections, &c.; and hence he directs attention to the importance of removing the tonsils, when enlarged, and correcting the morbid condition of the mucous membrane of the throat and fauces by local applications as well as general treatment.—(*Loc. cit.*)]

36. *C. Deafness from Plethora.*—*a.* Congestion of the vessels of the head or of the ear is not infrequently productive of deafness; and this congestion may either be purely local, or connected with a state of general plethora. In cases of this kind, the patient complains of headache, vertigo, throbbing noises in the ears or head, or momentary unconsciousness, which are increased by warmth, by a stimulating regimen, and the horizontal position. This form of affection is most common early in life, and again at middle age, or soon after; and especially in those who are subject to hæmorrhoids unattended by discharge, and in females who have experienced an interruption of the catamenia, or in whom this evacuation has ceased. The strictly local state of the affection may follow suppressed evacuations of various kinds, or repelled eruptions, or even retrocedent gout; and modifications of it are occasionally met with in connexion with secondary syphilis, and with herpetic or other chronic eruptions.

37. *b.* The *Treatment* should, in great measure, depend upon the existence of local plethora or congestion only, or upon this state being associated with general plethora. The pathologist will generally decide correctly in these

* [*Deafness successfully Treated through the Passages leading from the Throat to the Ear*, &c., by James Yearsley, M.R.C.S., 3d ed. London, 1841, 12mo.]

cases; but when the affection has followed the disappearance of accustomed sanguineous or other discharges or evacuations, spontaneous or artificial; and when the pulse, habit of body, and temperament indicate vascular fulness, then general blood-letting, repeated according to circumstances, local depletions, purgatives, and external derivatives, low diet, and regular exercise will generally restore the hearing, if they be decidedly prescribed and rigorously pursued. Deafness, however, from local plethora, and especially from congestion of the vessels of the organ, is not so easily remedied; and, when remedied, is liable to return. Local depletions, either from the vicinity of the organ, or from the anus, when there is a tendency to hæmorrhoids; blisters applied on the nape, and kept long open, or preferably issues or setons; deobstruent purgatives or aperients, regularly and long persisted in; the warm or vapour bath, and other means calculated to promote the cutaneous functions, and prevent them from being interrupted, will be most serviceable for this form of the affection. If it have followed the suppression or disappearance of some eruption, discharge, or external affection, derivatives to the extremities, &c., sinapisms, blisters, &c., should be resorted to. If it have occurred in connexion with secondary syphilis, a mercurial course will remove it, unless organic lesion of the Eustachian tube, or in the cavity of the tympanum, &c., have taken place. When it is associated with herpetic or other chronic eruptions on the skin, the same internal and external means which succeed in removing these will also generally improve the hearing, especially alteratives, purgatives, diaphoretics, sulphureous, fumigating, and other medicated baths, and strict attention to diet, and to appropriate means for improving the digestive, the assimilating, and the excreting functions.

38. IV. DEAFNESS AND DUMBNESS most commonly proceed from acute or chronic *otitis* in early infancy, giving rise to organic changes in the delicate and complex structure of the ear, especially in the labyrinth, and in the acoustic nerves; or from diseased changes near the origin, or in the course of these nerves. When deafness is *congenital*, one or other of these lesions may be inferred to have taken place in the fœtus; or the organ, or nerves of hearing, may be considered as having been imperfectly developed in some of their parts. Deafness and dumbness are very seldom remedied, and never if the deafness has been congenital. If the affection has arisen in infancy from disease of the ear, then the treatment may be carefully directed to the removal of the morbid conditions which that disease may be presumed to have occasioned; but the utmost attention must be paid to the history of the case, to the existing state of the organ, and of the constitution, and especially to the phenomena connected with the brain and digestive organs. Cases of this kind are rarely treated with success; but, for this very reason, they should be placed under the care of a scientific medical practitioner, and be treated according to general principles directed to the particular lesions of the organ, and to the pathological states of the system. That these cases ought not to be despaired of, is proved by the instances of success detailed by M. ITARD, in an instructive chapter on the subject.

39. V. OF CERTAIN REMEDIES RECOMMENDED for IMPAIRED OR LOST HEARING.—With a desire of restoring the affections of the ear to the care of the regular practitioner, from whom the pretensions and advertising assiduities of empirics have almost entirely removed them, I shall next take a brief survey of the principal remedies employed in the treatment of these affections. And here I may remark that none but well-educated medical men, pursuing other branches of practice, should undertake the management of these disorders; for they only are capable of ascertaining the various pathological conditions of which deafness is either an immediate, or a remote and indirect consequence, and of appropriately prescribing means of cure—of employing these means without risk of injury to the function, or to the organ, or even to the brain, with which the organ is so intimately connected.

40. *A. Constitutional Means.—a. Vascular depletions*, general or local, are necessary when inflammatory action, or general or local plethora is present. In other circumstances they are inadmissible.—*b. Purgatives* are required in similar states; and when deafness is associated with disorder of any of the digestive organs, and with costiveness. They were much praised by DIEMERBROECK, HOFFMANN, and FABER. They are injurious in purely nervous deafness, unless conjoined with stomachics and tonics.—*c. Emetics* have been recommended by STOLL, LAVAUD, and KENNEDY, and are sometimes of service when the hearing is impaired by inflammation of the ear, or by collections of mucus in the guttural extremity of the Eustachian tube, or when the affection is connected with deficient action of the biliary apparatus. In nervous deafness they are useless, and, when congestion of the brain is present, they may be injurious.—*d. Tonics* and *stimulants*, especially the preparations of cinchona, of cascarilla, of iron, of serpentaria, of arnica, of camphor, of ammonia, the æthers, &c., have been very generally resorted to in nervous deafness, and sometimes with benefit, when judiciously employed.—*e. Alteratives* and *deobstruents*, especially *mercurials* and *iodine*, or a combination of them, may be severally prescribed when the deafness is dependant upon secondary syphilis, or upon constitutional vice, or is connected with chronic cutaneous eruptions. They may also be tried when thickening of the membranes of the ear, or of the Eustachian tube, or obstructions of the latter by mucus are supposed to exist.—*f. Salivation* was recommended by DESAULT and ETTMULLER, but is requisite only when the affection proceeds from venereal ulceration in the vicinity of the organ.—*g.* The preparations of *squills* internally have been advised by LANGE, when the Eustachian tube is obstructed by mucus; and a course of *dulcamara* by CARRERE, when deafness is associated with herpetic eruptions. *Sulphur* and the balsam of sulphur may be prescribed, as directed by RULAND, in these or similar circumstances.

41. *B. Of Local Remedies.—a.* Of these the most vaunted are *electricity*, *galvanism*, and *mineral magnetism*, but chiefly by those who are adepts in these departments of quackery. The

inutility of, and even occasional risk from these means have been shown by HALLER, DE HAEN, ZETZEL, FREESE, and TREVIRANUS. Dr. KRAMER has examined the proofs as to the efficacy of *electricity* in deafness, furnished by the most respectable of those who have written upon the subject; and has shown that not one case can be said to have been cured, although many have been made worse by it. The opinions of ITARD and DELEAU nearly coincide with those of Dr. KRAMER. Many cases have been published as cures by *galvanism* and *mineral magnetism*, but the improvement said to have occurred has continued only as long as the excitement occasioned by the employment of these agents. In most cases, however, no benefit has been derived from them, or it has been apparent only, or has existed merely in the patient's imagination. In two or three instances, patients have conceived their hearing to have been somewhat improved by galvanism; but I have observed that this sense has nevertheless become more and more impaired.*

42. *b. Moxas* have been praised by PAROISSE, LODER, and ITARD. Dr. KRAMER is not favourable to them; but the testimony of a person who has a favourite remedy of his own, and finds fault with nearly all other means, should be received with reservation. M. ITARD, whose experience and opinion are equal to those of Dr. KRAMER, is in favour of them, in the cases in which they have been prescribed above.—*c. Issues* and *setons* have been employed by ZACUTUS LUSITANUS, ETTMULLER, ITARD, and others, as derivative means. They should be inserted in the nape, or in the arm, in those states of the affection for which they have been already recommended. They will often prove inefficacious, or even injurious, if resorted to inappropriately; and especially in cases of idiopathic palsy of the acoustic nerves, or in old, enfeebled persons; or when the deafness has been caused by exhausting or depressing causes.—*d. Blisters*, applied behind and below the ears, and often repeated or kept open, have been praised by RIEDLIN, LAVAUD, STOERCK, WENDT, ITARD, and others. Dr. KRAMER considers that they, as well as the *tartar emetic ointment*, are indicated only in circumscribed inflammation of the auditory passage and membrana tympani. He prefers the ointment, which he rubs below the mastoid process, to avoid injuring this part. These means, however, admit of a more general application than he has allowed.

43. *C.—a. Masticatories* were prescribed in deafness by WEPFER, DIEMERBROECK, STAHL, and MORGAGNI; but they are now entirely neglected. Several states, however, of this affection admit of a trial being safely given to them.—*b. Gargles* are among the most useful means that can be resorted to in those states of the affection which originate in acute or chronic diseases of the throat. And when it is considered how very often inflammations of the ear and deafness are caused by lesions of the Eustachian tube, proceeding from the throat and posterior nares, especially during the various forms of cynanche, and in the course of eruptive fevers, the importance of these means cannot be overrated. These applications should be suited to the nature of the affection of the throat; in the more sthenic states of inflammatory action, they should be refrigerant, and contain the nitrate of potash, or hydrochlorate of ammonia, or biborate of soda; in the more asthenic forms of affection, they may be astringent, tonic, and stimulant, and may also contain either of these, or some other detergent substances. When the occlusion of the guttural extremity of the Eustachian tube with mucus is suspected, these salts, especially the last, will be of service; and, when the deafness is in great measure nervous, the tincture of capsicum may be added to these, or to any other form of gargle that may be preferred. In deafness connected with secondary syphilis (§ 20), the bichloride of mercury will be employed, in the form of gargle, with advantage.

44. *D. Drops* and *Injections*, especially those of a spirituous, irritating, or acrid nature, into the auditory passage, are justly considered by ITARD and KRAMER to be injurious. But various stimulating or rubefacient applications about or below the ear, as garlic, onions, rue, &c., have, according to HOFFMANN, MULLER, and others, sometimes been resorted to with advantage in nervous deafness. Dr. TURNBULL recommends ointments with either *veratria*, *delphinea*, or *aconitine*, to be rubbed around the ear daily; or four or five drops of a spirituous solution of either of these (gr. ij.–iv. to ʒss. of spirit) to be dropped into the ear. *Of perforation of the membrane* of the drum, notice has been already taken. Its want of utility, and the circumstance of its readily cicatrizing, have been pointed out by HUFELAND, NAASE, MAUNOIR, ITARD, and KRAMER. *Douches* of vapour or of water were formerly used in several affections of the ear. BARTHOLIN, HOFFMANN, and MICHAELIS advised warm vapours, containing various stimulating substances, as camphor, æther, &c., to be directed into the meatus. These, however, require much caution and discrimination; but they may sometimes be of service, especially in catarrhal affections of the ear, and in idiopathic nervous deafness. Dr. KRAMER undervalues these and other means, in order to enhance his own remedy (§ 45).

45. *E. Injections into the Eustachian Tube* were first recommended by GUIZOT; but CLELAND, in 1731, first proposed them in a practicable mode, namely, by the nose; and WATHEN long afterward proved that a favourable result might be obtained from the practice. The injection of fluids into the tube was advised by BUSSON and others, to be performed by filling the mouth with the fluid; and, having firmly closed the lips and nose, by forcing it into the tube. *Air* has also been directed to be forced into the tube, by CLELAND and SIMS, in the

* [Mr. DUFTON, in his late work (*The Nature and Treatment of Deafness and Diseases of the Ear*, London, 1844), remarks as follows in relation to this remedy:

"The author is much indebted to his friend, Mr. PILCHER, for frequent opportunities of witnessing the treatment of torpid nervous deafness by *electricity*, and can bear testimony to its utility in many cases. The failure of electricity, as a remedy, may in many cases be attributed to the want of a proper selection in the person thus treated. ITARD relates several cases in which much benefit was derived from the use of electricity; he, however, makes the following observation: 'et de nos jours cette méthode de traitement a été abandonné comme impuissante.' Yet, notwithstanding this observation, the author has seen several cases benefited by the use of electricity." We have employed galvanism in several instances, and continued its use for some time, but have observed no marked benefit from its application. Unless employed with great care, it is calculated to do injury rather than good. The testimony in relation both to galvanism and electricity, in the treatment of deafness, is exceedingly discrepant.]

same way, in order to remove obstructions of it; and the smoke of tobacco has been similarly used, with the intention both of removing obstruction and of exciting the organ in nervous deafness, but with very equivocal results; I know one instance in which it proved decidedly injurious. Injections of medicated fluids, of vapour, and of air into the Eustachian tube, by means of a suitable apparatus, have been severally resorted to by Itard, Deleau, and Kramer. Besides injecting air as a means of diagnosis, Dr. Kramer throws into the tube, through a catheter introduced into it, the vapour of *acetous æther*, generated, in a proper apparatus, at a summer temperature; but confines the practice to cases of nervous deafness characterized by torpor, or those unattended by noises in the ear. He also aids the local means by remedies intended to improve the constitution, and the digestive and other functions.

[The method of introducing the vapour of æther into the ear, as laid down by Kramer, is to adapt a cork accurately to a glass jar, passing two metal tubes through the cork, one of which is furnished with a funnel and stop-cock for introducing the fluid, the other with an elastic tube and stop-cock. The jar being half filled with warm water, a small quantity of the acetous æther is introduced through the funnel, which is immediately closed by the stop-cock; the elastic tube being then fitted to the catheter previously introduced into the Eustachian tube, and then opened, the æther, vaporized, rushes through the tube into the tympanum; or a wide-mouthed bottle may be procured, through the cork of which a metal pipe is passed in an air-tight manner, which pipe is furnished with an elastic tube and stop-cock. The bottle being half filled with warm water, about half a drachm of acetous æther may be poured into it, and the mouth immediately closed. The apparatus is very portable, and the elastic tube, with its stop-cock, is easily attached to the catheter, which should be previously introduced into the Eustachian tube. Should the æther not be readily volatilized, the bottle may be placed in a vessel of hot water, when it will be readily converted into vapour. This vapour may be applied two or three times at a sitting, and may be repeated daily, or every two or three days, according to the effect produced.—(See Pilcher, *loc. cit.*)

As the diagnosis of obstructions of the Eustachian tube, as well as of muculent accumulations in the middle ear, can only be accurately made out by the use of the catheter, a few directions for performing it may not be inappropriate. The catheter should be of silver and inflexible, about six inches long, and of a caliber ranging from the size of a crowquill to that of a large goosequill. The extremity should be well rounded, and should have a curve of about five lines from the farther end, which should correspond with the lateral situation of the mouth of the Eustachian tube. It should also be graduated by inch and half inch divisions, as these will facilitate its introduction. In passing the catheter, the instrument should be warmed and oiled, and passed along the floor of the nostril with the convexity upward and the concavity downward. It should then be gently turned just before it reaches the pharynx, so that the point shall be outward and a little upward, as the mouth of the Eustachian tube is above the level of the floor of the nose. The operator will readily feel when the catheter slips into the orifice of the canal.

The catheter is not only useful in diagnosticating some of the more important diseases of the ear; to inject water, air, or vapours into the middle ear; but also to dilate stricture of the tube, or of removing blood which may have accumulated in the tympanal cavity.]

46. *F. Russian Vapour Baths* have been much recommended in deafness, especially when it has been supposed to originate in exposure to cold; and *warm*, or *fumigating*, or *sulphur baths*, have likewise been employed in these and other circumstances of the affection. They may all prove injurious in cases connected with congestion in the head or ears, or with general plethora. They are most serviceable when constitutional complaints, especially chronic cutaneous eruptions, or an obstinately harsh and unperspirable state of the general surface, are associated with the deafness; this latter probably depending in part upon a somewhat similar state of the ears to that of the skin and general system. In these cases they should be cautiously employed, vascular determinations to the head or to the ears having been previously removed, and morbid secretions and excretions freely evacuated.*

Bibliog. and Refer.—*Celsus*, l. vi., c. 7; l. vii., c. 8.—*Severinus*, De Recond. Abscess. Nat., l. iv., c. 36.—*Sylvius*, Prax. Med., l. ii., c. 8.—*Zacutus Lusitanus*, Prax. Admirab., l. i., obs. 70.—*Valsalva*, De Aure Humana, 4to. Venet., 1740.—*Ettmüller*, Opera, t. ii., p. 738.—*Diemerbroeck*, Anat., l. iii., c. 18.—*Ruland*, Curat. Empir., cent. viii., c. 55.—*Bonet*, Sepulchretum, &c., l. i., s. xix., obs. i., *et seq.*—*Littre*, in Hist. de l'Acad. des Sciences, 1705, p. 53.—*Hoffmann*, Med. Rat. Syst., t. iv., par. iv., c. 6.—*Cleland*, in Phil. Trans., No. 461.—*Leschevin*, Mém. pour le Prix de l'Acad. de Chirurg., t. ix.—*Duverney*, De Organo Auditus, par. ii. et iii., *passim*.—*Morgagni*, De Sed. et Caus. Morb., Ep. iv., 8, 11; ep. vi., 4; ep. vii., 14; ep. xlviii., 48.—*Busson*, in *Haller's* Diss. Chirurg., t. ii., No. 44.—*Lieutaud*, Hist. Anat. Med., l. iii., obs. 128.—*Stoerck*, Libell. de Cicuta Secund., p. 231.—*Haller*, Element. Physiol., t. v., p. 286.—*Stoll*, Rat. Med., par. ii., p. 327.—*Sandifort*, Observ. Anat. Pathol., l. i., p. 116.—*Trnka de Krzowitz*. Historia Cophoseos et Baryecoiæ. Vindob., 1778.—*Z. Vogel*, Beobacht. und Untersuchung., No. 30.—*Zenker*, Mem. of the Med. Soc. of Lond., vol. iii., p. 549.—*Haighton*, in Ibid., vol. iii., p. 1.—*Sims*, in Ibid., vol. i., art. 5.—*Ackermann*, in Klinisch. Ann. von Jena, p. 96.—*Desmonceaux*, Traité des Mal. des Yeux et des Oreilles, 8vo. Paris, 1786.—*A. Scarpa*, De Auditu et Olfactu., fol. Paris, 1789.—*C. F. L. Wildberg*, Versuch einer Abhandlungs ueber die Gehörwerkzeuge, 8vo. Jena. 1795.—*A. Portal*, Cours d'Anat. Médicale, t. iv., p. 470.—*Dessault*, Sur les Mal. Vénér., p. 213.—*Lavaud*, in Journ. de Méd., t. lxxxi., p. 346.—*Zetzel*, in Ibid., t. v., p. 254.—*A. Monro*, Three Treat. on the Brain, the Eye, and the Ear. Lond., 1797.—*A. Cooper*, in Philos. Trans. for 1800, p. i., art. 8; and for 1801.—*Thomann*, Annalen ad 1800, p. 401.—*Ferguson*, in Med. and Phys. Journ., May, 1802.—*Wathen*, in Philos. Trans., vol. xlix., par. i., p. 213.—*Treviranus*, in *Horn's* Archiv., b. iii., p. 182.—*C. E. Fischer*, Abhandl vom Krebse des Ohres, 4to. Lueneb., 1804.—*C. F. B. Ettmüller*, Von den Krankh. des Ohres, 12mo. Lüb., 1802.—*Trommsdorff*, Journ. der Pharmacie, b. ix., st. ii., p. 136.—*Himly*, De Perforatione Tympani, in Goet. Anz., 1806. p. 1547.—*Hufeland*, Journ. der Pract. Heilk., b. xxiv., st. iii., p. 163.—*Naase*, in Ibid., t. xxv., st. iv., p. 168.—*J. M. Alard*, Essai sur le Catarrhe de l'Oreille, 8vo. Par., 1807.—*Maunoir*, in Journ. de Méd. Contin., t. ix., p. 106.—*Pfingsten*, Bemerkung. und Beobachtung. ueber Gehör,

* [Mr. Yearsley reports, as admitted at the "*London Institution for Curing Diseases of the Ear*," for 1838-39, a total of 203 patients. Of these were cured 81, improved 24, incurable 58, unknown result 34, remaining 6, which is a ratio of more than ⅓ cured. It is probable, judging from statistical results, that, under judicious treatment, nearly one half of all the cases of deafness, not including the aged, are susceptible of greater or less relief.]

Gefühl, Taubheit, &c. Altona, 8vo, 1811.—*J. C. Saunders*, The Anat. and Diseases of the Ear, 2d ed., 8vo. Lond., 1817.—*Monfalcon, Deslongchamp*, et *Marquis*, in Dict. des Sciences Méd., t. xxxviii. Paris, 1819.—*Itard*, Traité des Mal. de l'Oreille, 2 tomes, 8vo. Paris, 1821.—*J. Frank*, Prax. Med. Universæ Præcepta, t. iii., p. 880.—*M. Deleau*, Mém. sur la Perfor. de la Memb. du Tympan., 8vo. Paris, 1822.—*L. Meiner*, Die Krankh. des Ohres und Gehörs, 8vo. Leips., 1823.—*J. A. Saissy*, Essai sur les Mal. de l'Oreille Interne, 8vo. Paris, 1827.—*Hufeland*, in Nouv. Journ. de Méd., t. xiv., p. 3.—*M. Pinel*, Archiv. Gén. de Méd., t. vi., p. 247.—*J. H. Beck*, Krankheiten d. Gehörorgans, 8vo. Heidelb., 1827.—*M. Deleau*, Mém. sur le Catherrisme de la Trompe d'Eustache., 8vo. Paris, 1827.—*J. Burne*, in Cyclop. of Pract. Med., vol. iii.—*W. Kramer*, Die Erkenntniss und Heilung der Ohrenkrankheiten, 8vo. Berlin, 1836. —Rev. in Brit. and For. Med. Rev., No. v., p. 79.—*A. Turnbull*, Treat. on Painful and Nervous Dis., and on those of the Eye and Ear, 8vo. Lond., 1837.—(See, also, Biblioo. and Refer. of art. Ear.)

[*George Pilcher*, A Treatise on the Structure, Economy, and Diseases of the Ear; being the Essay for which the Fothergillian Gold Medal was awared by the Medical Society of London, 1st Am. Ed. Phil., 1843,—*Robert B. Todd*, The Cyclopædia of Anatomy and Physiology. Lond., 1839, part xv.—*T. Wharton Jones*, Organ of Hearing, in Ibid.—*Joseph Toynbee*, Second Series of Observations on the Pathology of the Ear, based on 120 Dissections of that Organ, in Med. Chir. Trans., 2d ser., vol. viii., 8vo, p. 425. Lond., 1843 (Mr. T. holds that the most prevalent cause of deafness is chronic inflammation of the mucous membrane which lines the tympanic cavity, and that by far the greater majority of cases commonly called nervous deafness ought more properly to be attributed to this cause).—*Joseph Williams*, Treatise on the Ear, &c., Ed. Prize Essay, 1840.—*James Yearsley*, Deafness successfully Treated through the Passages leading from the Throat to the Ear, 3d ed. Lond., 1841, 12mo.—*William Kramer*, Nature and Treatment of the Diseases of the Ear, translated from the German by *James Risdon Bennett*, M.D., Am. Ed. Philad., 1838, 8vo.—*William Dufton*, The Nature and Treatment of Deafness and Diseases of the Ear, and the Treatment of the Deaf and Dumb. Lond., 1844, 12mo.—*S. Saissy*, On the Ear, translated by *N. R. Smith*.—*J. H. Curtis*, An Essay on the Deaf and Dumb, showing the Necessity of Medical Treatment in early Infancy, with Observations on Congenital Deafness, with Plates, 1 vol., 8vo.—Brit. and Foreign Med. Rev., No. 20.—Med. Chir. Rev., Nos. 76, 81, 87.]

HEART AND PERICARDIUM—Diseases of the.

—Syn. Καρδία, Χέαρ, Χῆρ, Gr. *Cor*, Lat. *Das Herz*, Germ. *Cœur*, Fr. *Cuore*, Ital. Περικάρδιον, Gr. *Pericardium* (from περι, around, and καρδία, the heart). *Péricarde*, Fr. *Der Hertzbeutel*, Germ. *Pericardio*, Ital.

1. I. Introductory Remarks. —The progress that has been made in the knowledge of the diseases of the heart may be dated from the appearance of the writings of Hartenfels, Bonet, Vieussenx, Lancisi, and Barbeyrac, toward the close of the seventeenth, and at the commencement of the eighteenth century. Lancisi first directed attention to lesions of the valves, and to hypertrophy of the heart, as causes of sudden death. Morgagni, Senac, Meckel, Juncker, and Spaventi farther advanced our knowledge of these diseases; but, from the middle of the last century, when the work of the last-named writer appeared, until the beginning of the present, when Corvisart wrote, this department of pathology was completely neglected. With Corvisart the recent progress that has been made in it may be said to have commenced. His work was soon followed by that of A. Burns, by the engravings of Baillie, and by the fragment of Farre, in this country; and by the works of J. C. Warren, in North America; of Testa, in Italy; of Kreysig, in Germany; and of Bertin and Laennec, in France. Still more recently, the publications of Louis, Andral, Williams, Elliotson, Hope, Stokes, Watson, Latham, Corrigan, Bouillaud, and the contributions of many others, have farther enriched this department of our science.

2. i. *Of certain Topics relative to the Structure and Actions of the Heart in Health*, &c.—*a. The layers of muscular fibres*, and their various and tortuous directions, in the different compartments of the heart, require not particular notice here. According to M. Gerdy, these layers amount to six in the left ventricle, and only to three in the right; in both auricles, there are two in each. The muscular tissue of the right auricle is less abundant than that of the left, and leaves minute intervals betweeen its fibres, allowing the external and internal membranes to come in almost immediate contact. To this circumstance M. Bouillaud imputes the frequent association of inflammations of these membranes. The muscular fibres of the heart are more distinct in the fœtus than in the adult; this organ only participates in the general paleness of muscles at that epoch, although it is deeper coloured than they. It is also entirely without fat at this period. In corpulent persons, the external layers of muscular fibres, especially at the base, are covered with fat, which sometimes presents a watery or gelatinous appearance in the cachectic or leucophlegmatic. In old age, the texture of the heart becomes soft and flaccid, and the parietes of the cavities thin. The cavities themselves enlarge, especially the right; and the surface of the organ is charged with fat. The *chordæ tendineæ*, the whitish *zones* at the base of the valves forming the contour of the orifices, and the *interior of the valves* themselves, are principally formed of fibres or albugineous tissue, which often becomes, especially in the latter situation, the seat of serious lesions, particularly in persons far advanced in life.

3. *b.* The *internal surfaces* of the heart, as well as the parts just named, are covered by a transparent, pellucid, and whitish membrane, resembling the most attenuated serous membranes. It is more delicate in the right than in the left cavities; and the least so in the auriculo-ventricular and arterial orifices. It is readily stained by the colouring matter of the blood, owing to imbibition during certain states of this fluid. It is perfectly smooth and polished; but in the situation of the orifices, where it is thickest, it often becomes rough or uneven, from chronic inflammation, which most frequently occurs in these parts, and in the valves. It is connected to the fibrous and muscular tissues by a fine cellular substance, which often is thickened or otherwise altered by disease. This membrane has been appropriately called the *Endocardium* (from ἔνδον, within, and καρδία, the heart) by MM. Barbier and Bouillaud. It adheres so firmly to the adjoining tissues that it can be detached only in small pieces; but, in certain diseases, it can be removed in large shreds. At the base of the valves, where the two layers of this membrane separate to receive the tendinous rings bordering the orifices, the *endocardium* and *pericardium* are nearly in contact with each other, or are connected merely by a fine layer of cellular tissue. This state of structure, and its connexion with the enclosed fibrous tissue, explain both the frequent co-existence of internal and external inflammation of the heart, and the intimate connexion often existing between these inflammations and rheumatism.—*c.* Of the *pericardium* it is unnecessary to say more than

that it is a serous membrane, forming, as in all other situations, a shut cavity, reflected over the heart and origin of the large vessels, and over the fibrous bag enclosing this organ. Its free surface is polished, smooth, and bedewed with an exhalation preventing friction, and the production of any sound; but when it is diseased, morbid sounds, as well as other phenomena, result.

4. *d.* The *nerves* of the heart have been a subject of interest with pathologists. They are derived chiefly from the ganglia of the great sympathetic, a few only coming from the pneumo-gastric, but these latter seem rather to inosculate or communicate with the plexuses of the former than to directly supply the texture of the organ. The cardiac ganglion seems more particularly to preside over the actions of the heart, or to re-enforce with additional energy whatever it may receive from other sources, especially from the centre of the ganglial system, and the other ganglia in the neck and chest. These nerves supply the substance of the heart in two ways: 1st. There are numerous branches which proceed from plexuses directly to the muscular texture, and which, dipping between the fibres, give off minute fibrillæ to the muscular fibres next to them in their descent into the substance of the heart; 2d. A large portion of the cardiac nerves form a reticulum around the coronary arteries. A part of these follow the arteries to their distributions; but before these arteries are ramified minutely, a part of the nerves surrounding them is detached to adjoining tissues, so that *all* the nerves reticulated around the coronary arteries do not accompany them to their ultimate distributions or terminations.

5. *A. The Actions of the Heart* may reasonably be referred chiefly to the influence which the ganglial nervous system bestows on the muscular structure of the organ. Haller attributed them to *irritability*, or a peculiar power inherent in the muscular fibres themselves. But I have contended in several publications, since 1820, that the ganglial system is the source of irritability; and the same view has been more recently adopted, and ably supported by Dr. Fletcher. The experiments of Willis, Home, W. Philip, Clift, Brachet, and others show that the actions of the heart are independent of the cerebro-spinal nervous power, although they are influenced by it. In experiments which I performed, in 1818, on several species of fish, the heart continued to contract not only after the destruction of the cerebro-spinal axis, but even for some time after it was removed from the body. Cases, also, have been observed by Lallemand, Lawrence, and others of the absence of both the brain and the spinal chord, and yet the circulation continued for a considerable time after birth. An instance very nearly of this kind has very recently been observed by my late colleague Dr. Sweatman. Humboldt found that the contractions of the heart, even after the removal of it from the chest, were more frequent and forcible, upon the application of the galvanic current to one of the cardiac nerves; and Home and Weinhold obtained nearly similar results from their experiments. In 1820, I repeated these experiments, and the phenomena were the same as observed by these physiologists. The more recent researches of M. Brachet show the justness of my views as to the dependance of the heart's action upon the ganglial system, and which were published twelve years before the appearance of his work upon this system. In my publications on this subject, it has been farther contended that *irritability* does not exist as an independent principle, but as one of the vital manifestations of this system, exerted through the medium of muscular or fibrous tissues.

6. *B.* Such, therefore, being the source of the heart's action, the *chief seat of action* requires some notice. I believe that too much importance has been attached to the auricles in estimating the motions of the heart, and that the contractile force of these compartments is much less than is supposed. From some experiments I performed about twenty years ago, I concluded that the actions of the heart should be referred chiefly to the ventricles, and agreed with Hamberger in allowing them a dilating power, but considered that Dr. Carson pushed this opinion too far. I farther observed that, if the dilatation of the ventricles were a result of a relaxation of their parietes merely, the cavities would not be so quickly and perfectly filled by the mechanical pressure of the blood as they are; and dilatation would be only the consequence of this pressure, and be proportionate to it. But such is not the case; for, on close observation, the dilatation always appears as the cause of the flow of blood. The opinion of M. Bouillard nearly agrees with the above inferences, published by me in 1824. He, however, considers the injecting powers of the auricles to contribute to the dilatation of the ventricles, and attaches too much importance to the elasticity of their muscular parietes in aiding this action. If the contractions of the auricles were as energetic as commonly believed, a valvular apparatus would have existed between them and the roots of the large veins. The actions of the ventricles should, therefore, be viewed in the double light of *energetic contraction* and *active dilatation:* by means of the former, the blood is propelled along the arteries; and, by aid of the latter, it is drawn into the ventricles, as well as into the auricles, a current from the smaller veins being thus kept up towards the heart. (See *Notes and App. to* M. Richerand's *Elements of Physiology*, &c., by the author.)

7. ii. *Of the Weight and Dimensions of the Heart in Health and Disease.—A.* It is obvious that no precise idea can be formed as to atrophy and enlargement of this organ without having previously determined the dimensions and weight of it in health. This M. Bouillaud has endeavoured to ascertain. The following results are abstracts of his researches, and are given in the French weights and measures. He considers that the common opinion of the closed hand being the size of the heart of the same person is very nearly the truth; and that the opinions of Cruveilhier and Lobstein as to the weight and size of the healthy organ are neither precise nor correct. In fourteen cases, (*a*) The *heart's medium weight* was 8 oz. 3 dr. (9 oz. 4 dr.), the greatest being 11 oz., and the least 6 oz. 2 dr.; but its weight varies with the size of the person: it also is less in females than in males. The heart cannot be said to

have arrived at its full development until 24 or 25 years of age.—(*b*) The medium *circumference of the heart*, at the base of the ventricles, was 8 inches 9 lines; the least being 8 inches, the greatest being 10 inches 6 lines.—(*c*) The *medium thickness of the walls of the left ventricle* was 6½ lines; the maximum being 8, and the minimum 5 lines. The *medium thickness of the parietes of the right ventricle* was 2½ lines; the maximum being 3½, the minimum 1½ line. The *interventricular partition* was 7 lines in thickness. The *medium thickness of the parietes of the left auricle* was 1½ line; that of the *right*, 1 line.—(*d*) M. Bouillaud confirms the statement of Legallois, that the *medium capacity* of the right ventricle is somewhat greater than that of the left, and that of the right auricle greater than that of the left.—(*e*) The *circumference of the left auriculo-ventricular orifice* is about 3 inches 6 lines; that of the *right*, 3 inches 10 lines; that of the *ventriculo-aortic orifice*, 2 inches 5½ lines; and that of the *ventriculo-pulmonary orifice*, 2 inches 7¾ lines.

8. *B.* Of seven cases of *atrophy of the heart*, (*a*) the *medium weight* was 175 grammes (or scruples = 7 oz. 2 dr. Eng.), the maximum being 200, the minimum 135 grammes.—(*b*) The different compartments of the organ, in a state of atrophy, generally preserve their relative dimensions. Sometimes, however, the parietes of the ventricles retain their usual thickness, chiefly from contracting on themselves and diminishing their capacity. In atrophy, also, the mean weight of the organ may be much lessened, while the dimensions of the whole, or of certain compartments of it, may not be sensibly, or may be only slightly diminished.

9. *C.* In *hypertrophy of the heart*, (*a*) The *mean weight* of thirteen cases was 473 grammes (scruples) 5 grains; the maximum being 688, the minimum 338 grammes.—(*b*) The *mean circumference* of the organ was 11 inches 10¾ lines; the maximum being 12 inches, and the minimum 8 inches 10 lines.—(*c*) The *mean thickness* of the *left ventricle* was 10½ lines; the maximum being 1 inch 1 line, the minimum 7 lines.—(*d*) The *mean thickness* of the *right* was 3¾ lines; the maximum being 4½, the minimum 3 lines. The mean thickness of the *left* and *right auricles* was 2½ lines, and 2½ lines respectively, that of the *interventricular partition* being 9¼ lines.—(*e*) The *capacity* of the left ventricle was generally more or less increased; that of the right was also increased in one third of the cases. In three instances, the capacity of the ventricles was diminished.—(*f*) The *circumference* of the *left auriculo-ventricular orifice* was increased in three cases, in one of them to 4 inches 3 lines; that of the *right* was augmented in five instances, in one of which it reached 5 inches 9 lines; and that of the *ventriculo-pulmonary orifice* was increased also in five, and reached in one 3 inches 6 lines.

10. iii. *Of the Sounds of the Heart.*—In the article on Auscultation, I stated the received opinions as to the sounds of this organ, and remarked that the subject required farther investigation. Since that time, several able inquirers have entered upon it, and may be said to have settled the question. Harvey and Haller described the contractions of the auricles as preceding those of the ventricles. This, the true view of the matter, was departed from by Laennec, who conceived that the contractions of the auricles followed those of the ventricles. The researches of Turner, Corrigan, Williams, Hope, and Bouillaud have shown the inaccuracy of Laennec's opinion. Dr. Williams, especially, has assiduously investigated this subject; and as his inferences have been, upon the whole, confirmed by the Committees of the British Association, I shall follow him chiefly in the few remarks which remain to be made respecting it. 1st. The contraction of the ventricles, following immediately that of the auricles, is accompanied by the *first*, or *dull sound*. This *systole*, by straightening the anterior convexity of the ventricles, brings the apex of the heart into forcible contact with the ribs, and thus produces the *impulse* or shock. The systole, by throwing an additional quantity of blood into the arteries, causes the arterial pulse, which is synchronous with the systole in arteries near the heart; but, in those more distant, succeeds it at an interval occupied by the transmission of the wave through the blood along the elastic tubes from the heart. 2d. The systole of the ventricles is immediately followed by the *diastole*, which is attended by the *second* or *short sound*. 3d. There is afterward an interval of *rest*, at the conclusion of which the auricles contract, and the series of motions is repeated as before. The points which here remain to be settled are, (*a*) the way in which the systole of the ventricles produces the first sound; and (*b*) how the diastole causes the second.

11. The *first sound* was ascribed, by Mr. Carlile, to the rush of blood into the great arteries; by M. Rounet and others, to the closing of the auriculo-ventricular valves; by Dr. Hope, to the collision of the particles of fluid in the ventricles; and by Dr. Williams, to the muscular contraction itself. The *second*, or short sound, was ascribed, by Dr. Hope, to the impulse of the blood from the auricles refilling the ventricles; by Elliott, Carswell, Rouanet, Carlile, Bouillaud, and others, to the suction of the ventricles causing the elevation of the sigmoid valves, and to the reaction of the arterial columns of blood against these valves. The experiments performed by Dr. Williams, assisted by Dr. Hope and several other able physiologists, in order to determine these points, proved that the *first sound* is produced by the muscular contraction of the ventricles; and that the *second sound* is caused by the reaction of the arterial columns of blood tightening the semi-lunar valves at the diastoles of the ventricles. Dr. Williams, Dr. Hope, and M. Bouillaud concur in considering the *impulse* or stroke of the heart to be effected by the apex alone; while the experiments of the Dublin Committee seem to show that the body of the ventricle is also concerned in producing it. The London Committee admit that the first sound is caused by muscular tension, but think that the impulse may be an accessory. In other respects they all tolerably agree.

12. iv. *The morbid Actions and Sounds of the Heart* have been very fully considered in the article Auscultation (§ 25). Little, therefore, remains to be noticed respecting them at this place beyond a brief mention of the views of

some writers of eminence that have appeared since that article was published.—*A.* As may be expected, *à priori*, the duration of the systole seems often to be prolonged by the difficulty experienced by the blood in passing through the morbid arterial orifices. Continued and violent palpitations, particularly in cases of hypertrophy, tend eventually, according to the observations of M. Bouillaud, to produce marked prominence of the præcordial region. I have remarked this, also, in cases of sub-acute and chronic pericarditis. In a case of pericarditis complicated with rheumatism of the joints, in a child seven years of age, who was long under my care, this prominence and the palpitations were remarkable; but, after a time, these disappeared, and the lower half of the sternum, with the cartilages of the ribs, became drawn inward, and towards the spine, to such an extent as to form a very remarkable cavity in the præcordial region. This occurrence was so singular, that I caused the patient to be shown to several of my colleagues at the Middlesex Hospital. It appeared to have arisen from adhesion of the pericardium to the heart, and from the subsequent atrophy of the latter.

13. *B.* The *intensity of the sounds*, as well as of the impulse of the heart, varies remarkably. In some instances the sounds are feeble, and heard with difficulty; while in others they are heard at a distance of two or three feet. Although the impulse against the ribs does not produce either of the natural sounds, yet, in violent action of the heart, the more sudden and abrupt strokes cause a sound, constituting the termination of the first sound in these cases, and which seems nearer the ear, and more like a knock than what is heard in the ordinary action of the heart. The sounds may assume a dry or hard character, which Bouillaud imputes, but I think incorrectly, to hypertrophy and rigidity of the mitral valve; or they may be large, hoarse, or rough, owing, as he thinks, to a fungoid or infiltrated condition of the valves, which are then soft and flaccid. The saw sound sometimes has a peculiar *hissing* character, and at others a thick or *rough tone*; but all these are merely modifications of the bellows sound, and are very commonly connected with narrowing of the orifices of the compartments. Laennec considered them to proceed from spasm; of the existence of which, however, we have no satisfactory proof. A sound, which varies in tone from the *cooing* of a dove to the *chirping* of birds, or the *sibilous* noise of bronchitis, is more rarely heard: I have heard it only twice. It has also been noticed by M. Bouillaud, Rouanet, and I believe, by Dr. Watson. It seems connected with narrowing of the orifices. I heard it in a case of rheumatic pericarditis in a child. The *bellows*, or *blowing sound*, M. Bouillaud asserts, has been heard in upward of a hundred cases, where contraction of the orifices, with induration of the valves, was established by dissection; while M. Piorry states that his experience is at variance with this result. An able reviewer (*Brit. and For. Med. Rev.*, No. 2, p. 451) very justly remarks, that, although cases of well-marked contraction, with ossifications, &c., do present themselves, unaccompanied by any such abnormal sounds, such occurrences are extremely rare, and form only the exception, and not the rule, as M. Piorry would have them to do. It should also be kept in mind that the morbid sounds may be produced by a refluent, as well as by an onward motion of the blood, as M. Filhos has contended.

14. M. Bouillaud considers that the *bellows sound* may proceed from, 1. Narrowing of the orifices, with induration of the valves; 2. Smallness of the aortic orifice, although the valves are quite healthy; 3. Polypous exudations, resulting from acute inflammation of the endocardium; 4. Irregularity or roughness of the surface of the valves, or vegetations, or calcareous incrustations on them; 5. Infiltration of the valves from inflammation; 6. Adhesions of the auriculo-ventricular valves to the adjacent parietes; 7. Dilatation of one or more of the heart's orifices, with consequent inefficiency of the valves; 8. Hypertrophy, with dilatation of the left ventricles, although unattended by narrowing of the orifices; 9. Chlorosis, anæmia, and nervous affections of the heart, in some instances; 10. Extreme debility from hæmorrhage, or other depressing causes. It has been supposed that the bellows sound, which is not constant, or is only occasional, in the last three circumstances may arise from spasm. M. Bouillaud believes it to depend in these on a narrowing of the orifices, to adapt themselves to the diminished quantity of blood circulating through them. He farther considers that all the above cases are reducible to one common principle, namely, increased friction produced in some of them by the direct, in others by the refluent, current of the blood; but most frequently from the former cause. From this it is evident—and most experienced practitioners must have arrived at the same conclusions, from their own observations—that it is impossible to decide, from the bellows sound alone, in which of the orifices, if in any, the lesion is seated. The co-existence of this sound with the systole or diastole, and the situation in which it is loudest, may assist the observer, but still no accurate conclusion can be formed as to its precise cause. When the *sawing* or *rasping sound* is heard, the alteration may be considered to partake more or less of an osseous nature.

[We have already referred (art. Auscultation) to the late researches of Andral, by which it appears that an abnormal sound of the heart often exists independently of organic structure, and caused solely by modifications in the composition of the vital fluid—in other words, to changes in the relative proportion of the elements of the blood. Considering the proportion of red globules in healthy blood to be as 127 in 1000 parts, he has shown that the following modifications are capable of producing the *bruit de soufflet*, or bellows sound. *First.* When the globules have diminished sufficiently to be below the cipher 80, this sound always exists in the heart and large arteries. *Second.* The bellows sound may be heard when the amount of globules ranges from 80 to 100, and occasionally when it reaches above 100; but never after it attains the physiological mean 127. Andral has observed this sound, under these circumstances, in putrid and eruptive fevers, pneumonia, rheumatism, and in numerous chronic diseases. Also, it is met

with often in pregnant women, in whom there is generally found to be a deficiency in the globular element of the blood. (*Hæmatolog., Am. Ed.*, Phil., 1844.)]

15. C. The *sounds produced* occasionally *by the surfaces of the pericardium* in a state of disease were overlooked by Laennec, and have only recently received attention. It is chiefly to Collin, Reynaud, Honore, Stokes, Williams, Mayne, and Bouillaud that we are indebted for observations respecting them. M. Bouillaud divides these sounds into three varieties: 1st. The *rubbing sound* resembles that caused by rubbing together two pieces of silk, or of parchment. It is to be distinguished from a similar sound produced by the pleura, by its being double and synchronous with the heart's action. It is most obvious in the systole, and is diffused over a considerable surface. 2d. The *creaking sound* is altogether similar to the creaking of leather, or of shoes, or of a saddle. M. Bouillaud remarked it once; M. Andral only once; and Dr. Williams in three cases. M. Collin and others have also heard it. I have met with it in two instances: one of them a boy, about ten years of age; the other a young lady of about twenty, who, in 1833, came from Brompton to consult me. She had, several months previously, experienced an attack of acute pericarditis; and, while describing her symptoms to me, she herself likened the morbid sound she heard in the præcordial region to the creaking of new shoes. I heard it distinctly with the unassisted ear. 3d. The *scraping sound* is such as may be expected to be produced by rubbing a rough and hard cartilaginous or osseous body against the pericardium. Its synchronism with the motions of the heart distinguishes it from similar morbid sounds originating in the pleura. M. Bouillaud states that the first two sounds occur only in acute pericarditis. In the two instances I met with there had existed the acute form of this disease; but it had long before subsided, leaving after it organic lesion, or, at most, a chronic state of inflammation. The friction or rubbing sound, in its faintest states, occurs in the early stages of acute pericarditis, and while the membrane is dry. The creaking or leathery sound seems to arise from thickening or condensation of the sub-serous and serous tissues of the pericardium, especially of the portion reflected over the heart; and the formation of a dense and elastic false membrane, with, perhaps, more or less adhesion of the opposite surfaces. The scraping or grating sound is caused by lesions which occur only in the more protracted cases of chronic pericarditis. When the bellows sound is heard in pericarditis, it does not necessarily depend upon this disease, but rather upon the co-existence of inflammatory action in the internal membrane of the heart, or the extension of it to the fibrous structure of the orifices or of the valves, and the consequent contraction or other lesions thereby occasioned.

16. v. *Percussion of the Cardiac Region* is best performed with the index finger of the unemployed hand as the medium, or plessimeter. In the healthy state, the extent of the dull sound generally varies from an inch and a half to two inches square, which answers precisely to the extent to which the heart is disengaged from the lungs. The extent of the dulness increases very much in hypertrophy of the organ with or without dilatation of the cavities, in simple dilatations, and in congestions of them occurring in various diseases. It is not unusual to find the dulness, in these circumstances, extending to five or six inches square. (See art. Auscultation.)

Bibliog. and Refer.—*W. Hervey*, De Motu Cordis et Sang. Circulatione, 4to. Frank., 1628.—*J. Smith*, King Solomon's Portraiture of Old Age, 8vo. Lond., 1666.—*R. Lower*, Tractat. de Corde, item de Motu et Colore Sanguinis, 8vo. Lond., 1669.—*R. de Vieussens*, Nouvelles Découvertes sur le Cœur, 12mo. Toulouse, 1706; et Traité Nouv. de la Structure du Cœur, 4to. Toul., 1715.—*W. Wood*, A Mechanical Essay on the Heart, 4to. London, 1729.—*P. Chirac*, De Motu Cordis Adversaria Analytica, 12mo. Paris, 1744.—*Author*, in Lond. Med. Repos. for May, 1822; and Notes and App. to *Richerand's* Elements of Phys., &c., p. 611, *et seq.* Lond., 1824 and 1829.—*Vaust*, in Journ. Univers. des Sciences Med., t. xxvii., p. 164.—*Gendrin*, Archives Génér. de Méd., t. xvi., p. 123.—*W. Stokes*, in Dubl. Journ. of Med. Sciences, vol. iii., p. 50; vol. iv., p. 29.—*Turner*, Trans. of Med. and Chirurg. Soc. of Edin., vol. iii., p. 205.—*Spittal*, in Edin. Med. and Surg. Journ., July, 1826, p. 132.—*Corrigan*, Trans. of King's and Queen's Coll. of Phys. Dubl., vol. i., N. S., p. 151.—*D. Williams*, in Edin. Med. and Surg. Journ., Oct., 1829.—*Pigeaux*, Archives Génér. de Méd., Juil. et Nov., 1832.—*Magendie*, Lect. in Lancet, Feb., 1835.—*Bryan*, in Ibid., Sept., 1833.—*Rouanet*, Journ. Hebdom., No. 97.—*Bouillaud*, in Ibid., 1834.—*T. Davies*, Lect. on Dis. of the Lungs and Heart, p. 369.—*Carlile*, Dubl. Journ. of Med. Science, vol. iv., p. 84.—*C. J. B. Williams*, The Pathology and Diagnosis of Dis. of the Chest, &c., 2d edit. Lond., 1835, p. 163.—Report of the Dublin Committee on the Motions and Sounds of the Heart, in Dubl. Journ. of Med. Scien., Sept., 1825, and Med. Gazette, vol. xvi., p. 777.—*Corrigan*, in Dubl. Journ. of Med. Science, vol. ix., p. 173.—*P. M. Latham*, Lectures on Subjects connected with Clinical Medicine. Lond., 8vo, 1836 (*An interesting work*).—*J. Bouillaud*, Traité Clinique des Mal. du Cœur, 8vo. Paris, 1835, reviewed in British and For. Review, No. 2, p. 425.—(See, also, Bibliog. and Refer. of art. Auscultation.)

[Am. Bibliog. and Refer.—*J. A. Swett*, Review of *Hope*, On Diseases of the Heart, in New-York Journ. of Med., vol. ii., p. 417.—*C. W. Pennock* and *E. M. Moore*, Report of Experiments on the Action of the Heart. Philadelphia, 1840, and in Am Ed. of *Hope*, On the Heart.—*Meredith Clymer*, Am. Ed. of *Williams*, On Diseases of the Respiratory Organs. Phil., 1845.—*T. Stewardson*, Am. Edition of *B'Watson's* Principles and Practice of Medicine. Phil., 1844.—Medical Examiner, No. 44.]

II. A General View of Diseases of the Heart. —Syn. Καρδίας νόσοι, Gr.; *Cordis Morbi*, Lat.; *Herzkrankheiten*, Germ.; *Maladies du Cœur*, Fr.; *Malattie del Cuore*, Ital.; *Diseases of the Heart, Heart Diseases.*

17. As the various maladies of the heart frequently proceed from the same causes, often are met with in similar states of complication or association, admit often of the same prognosis, and even frequently require the same modes of treatment, I shall, in order chiefly to prevent repetitions, take a general view of them before I proceed to consider their specific forms.

18. i. The *Causes of Diseases of the Heart* are even more diversified than was supposed by Corvisart and some other writers.—*A.* The *Predisposing Causes* are nearly the same as those concerned in producing inflammatory and nervous diseases in other organs; but the unceasing actions and the intimate sympathies of this viscus not only increase the general predisposition, but also serve to impart a peculiar character to the effects more immediately produced on it by numerous physical agents and moral influences. The irritable, nervous, and sanguineous temperaments; a plethoric habit of body; the rheumatic and gouty diathesis; depression of mind; and the puerperal states, favour more or less the occurrence of diseases

of the heart. Lancisi, Albertini, Senac, Morgagni, Corvisart, Bouillaud, and others have remarked an hereditary predisposition to these diseases, independently even of either of the diathesis just particularized. Besides these, susceptibility of the nervous system, whether original or acquired; and pre-existent disorder, especially debility in its various forms; impaired digestive, excreting, and assimilating powers; morbid states of the blood, affections of the lungs and liver, and irritations of the uterus and spinal chord, predispose more or less to these maladies.

19. *B.* The *Exciting Causes* may be arranged into, 1st. The Mechanical and Traumatic; 2d. The Physical; 3d. The Moral; and, 4th. The Pathological.—*a.* Under the *first* of these may be arranged blows, falls, wounds, and external injuries directly or mediately affecting the organ; compression of the ribs or sternum, or of the hypochondria, by resting against a desk, and by strait lacing; and over-distention of the stomach by food or drink.—*b.* Among the *physical causes* may be enumerated, great muscular exertion, especially while the breath is retained; long journeys on foot, and fatigue; running against the wind, or ascending eminences or stairs; reading or speaking aloud, and singing, especially if long continued, or when impassioned; blowing wind instruments; straining at stool; advanced pregnancy; excessive venereal indulgences; the abuse of spirituous or fermented liquors; arsenical preparations in poisonous doses, or employed too long or in too large doses as a medicine; the injudicious use of other acrid substances; exposure to cold, or to cold and humidity conjoined, and to currents of cold air; wearing damp linen or clothes, or sleeping in damp beds or sheets; and drinking cold fluids or eating ices when the body is perspiring.—*c.* The *moral causes* comprise all the depressing and exciting affections of mind, especially when excessive, but more particularly the former. Sudden shocks, fright, terror, violent fits of anger, anxiety, grief, sadness, nostalgia, amorous affections—all not merely affect the functions of the heart in a very remarkable manner, but sometimes, also, alter its structure.

20. *d.* The *pathological causes* are still more influential than the causes already enumerated, and act in different ways. 1st. Some of them embarrass the actions of the heart, by impeding the functions of the diaphragm and lungs; a flatulent distention of the stomach or colon, enlargement of the liver or of the spleen, and effusions of fluid in the large cavities. 2. Others obstruct the circulation through the lungs, and consequently cause congestion or distention of the heart's cavities; as asthma, hooping-cough, pneumonia, bronchitis, convulsions, &c. 3d. Certain pathological states extend to the heart or pericardium from other parts, owing either to proximity of situation, or to their structure being of the same kind as that of the parts previously affected. Thus, inflammation of the external or internal membrane, or other diseases of the heart, appear in the course, or after the subsidence of pneumonia, of pleuritis, of rheumatism, &c. 4th. Some of these causes are connected with excessive vascular plethora, with or without a morbid condition of the circulating fluids; as the suppression of eruptions or discharges, and interrupted or impeded action of any of the principal assimilating and excreting organs. That the blood may become morbid, owing either to the imperfect assimilation and the injurious nature of the ingesta, or to the accumulation in it of the ultimate products and effete principles of assimilation requiring to be eliminated by the energetic action of the emunctories; and that this state of the blood may excite disease in some part of the heart's internal surface, seem more than probable. The changes in the circulating fluids, moreover, taking place in the course of fevers, or in connexion with the exanthemata, erysipelas, gout, &c., may also occasion disease of this organ; and it is not unreasonable to infer that, when this connexion is observed, as much is often owing to the morbid condition of the blood as to that of the living solids. 5th. In cases of suppression of gout or rheumatism, or the retropulsion of the exanthemata and of other acute cutaneous eruptions, it may be admitted that, while the constitutional disturbance upon which the local or external affection depends remains unabated, the suppression of the latter will very probably be followed by some prominent affection or localization of morbid action in an internal organ, especially if the powers of life are inadequate to throw it off upon some external part; and as, in these diseases, the circulating fluids are more or less altered, and the actions of the heart already much disturbed, one or other of the tissues or compartments of this organ will be quite as likely to become the seat of the superinduced malady as any other internal part; and even more so, as respects the rheumatism, owing to the predisposition arising out of identity or similarity of structure. 6th. One affection of the heart, functional or structural, may occasion another, or an additional lesion. Thus, violent palpitations sometimes rupture a muscular column, or tendon of the valves, or even the parietes of the heart itself; and narrowing of an orifice occasions dilatation of the cavity behind it, &c.

21. While Corvisart and Schina have attached the greatest share of importance to moral causes in the production of cardiac diseases, and undervalued the influence of physical agents, M. Bouillaud has over-estimated the latter at the expense of the former; and they, as well as all other writers, have either entirely overlooked, or have scarcely adverted to several of the antecedent changes or pathological states to which I have imputed so much in the causation of these maladies.

22. ii. *Of the Seat and Anatomical Characters of Diseases of the Heart.*—*A.* It is extremely rare, as M. Bouillaud remarks, to find the heart altogether diseased: most commonly a compartment only, or a portion of it merely, or even one of the tissues constituting it, is affected. Sometimes one or more valves or orifices are primarily altered; and in other cases, either the internal or external membrane or the muscular structure is changed. In one instance, a cavity is dilated and its walls thinned; in another, it is of natural capacity, but its parietes are remarkably thickened; and in others, the compartments individually present various lesions, as softening, hardening, &c.

23. *B.* The *intimate nature* of the heart's le-

sions is not always evident, even on the most minute examination. That they are frequently inflammatory, or of that kind usually so denominated, cannot admit of a doubt; and that they still more frequently are the consequences of inflammation in some one or other of its grades, modified, however, by the tissue in which it is seated, by the state of vital power attending it, and by the condition of the circulating fluids, is no less true, although less manifest than the former proposition. Inflammation affecting a serous surface gives rise to results varying with its intensity, and with the state of the constitution, in respect both of organic nervous energy and of vascular tone. When the latter remain unimpaired, the production of coagulable lymph is a common result; but the lymph, being secreted in a fluid state, will often, when the internal membrane of the heart is inflamed, be washed into the current of the circulation before it can be coagulated, and no very manifest evidence of the disease may be detected after death, although it has existed in its most intense form, or even has been the cause of death. When the inflammatory action is co-existent with depressed vital power and a morbid state of the blood, the fluid secreted by the inflamed surface is incapable of coagulating, and it readily mixes with and contaminates the vital current; the seat of disease presenting, after death, but little change beyond dark discoloration and softening. In respect both of the internal surface and of the substance of the heart, lesion of the capillary action and tone, as well as of vital cohesion, may have existed during life, and yet escape detection after death; and certain of the changes sometimes observed—especially alterations of colour, fibrinous coagula attached to the valves, &c., and slight effusion into the pericardium—have either taken place shortly before, or at the period of dissolution, or even soon after this issue.

24. Although most of the affections and lesions of the heart are to be imputed chiefly to inflammatory action and its consequences, varied by the conditions alluded to, yet they are not altogether of this nature, or do not always originate in this way. We have seen above (§ 5) that this organ derives its energies chiefly from the ganglial nervous system: it must, therefore, follow that extreme depression or exhaustion of this system must be attended by a marked alteration of the functions of the heart; indeed, the evident imperfection of the actions of the latter is one of the principal indications we possess of the exhaustion of the former. And if this alteration or imperfection of action continues long, or returns frequently, lesion of structure, especially dilatation, softening, thinning, atrophy, &c., of the parietes of one or more of the compartments of the organ, &c., must ultimately take place. Nor is this the only mischief; for, along with it, alteration of the circulating fluid often exists—this latter still farther impairing nervous or vital power—and, in connexion with both these pathological conditions, inflammatory action, or an altered state of vascular action, constituting one of the morbid conditions usually so denominated, occasionally, also, takes place in the internal surface of the heart, or in some other of its constituent tissues, giving rise to the farther changes already alluded to in general terms, and hereafter to be more particularly noticed.

25. iii. *The general Characters and Diagnosis of Diseases of the Heart* naturally divide themselves into, 1st. The *Local Signs*; and, 2d. The *General Symptoms*, or sympathetic phenomena. The former have been generally termed *physical*; the latter, *physiological* and rational; but the one class should always be considered in connexion with the other in the course of practice.—*A.* The *local signs* are ascertained by *auscultation*, *percussion*, *inspection*, and *palpitation*. Of the former of these means sufficient notice has been taken. (See arts. Auscultation and Chest.) The latter requires equal care with the former; and the sensations communicated to the hand of the examiner, as well as those excited in the patient by the examination, should be attentively ascertained and estimated. The indications furnished by these means are diversified according to the nature of the diseases which furnish them; but they can be known only by listening to the extent, seat, and nature of the sounds given out by the organ or elicited by percussion; by observing the form and motions of the præcordial and adjoining regions; by feeling the motions, tremours, or thrills often existing in these situations; and by ascertaining the sensations of the patient upon pressing between the ribs, or on the præcordia, or upward upon the diaphragm, and under the anterior margin of the left floating ribs.

26. *B.* The *general symptoms*, or sympathetic phenomena, are ascertained from attentive observation of the several related functions. The very intimate relation of the heart to all the principal viscera, but especially to the blood and circulating vessels, to the organic or ganglial nervous system, and to the respiratory organs, and the influence which these exert upon this organ, and which it exerts upon them, severally and conjointly, require to be kept in view. The manner, also, in which the brain, the liver, and other digestive organs are often affected by diseases of the heart, may likewise be made a source of information. Most of the connexions which have been traced between affections of distant organs and the heart have been imputed to augmented or impaired actions of the latter—most frequently to hypertrophy. But there is sufficient evidence to prove that interrupted circulation, caused by alterations of the valves or of the orifices, is much more concerned in the production of sympathetic disturbance, and even of structural lesion, of remote as well as associated parts, than hypertrophy or excited action. An impeded passage of blood from the auricles occasions congestion of the venous system; serous effusion into shut cavities, and cellular or parenchymatous structures; hæmorrhages from mucous surfaces or into the substance of organs; and not infrequently congestions or enlargements of the liver or spleen. When hypertrophy exists, it is generally caused by the increased action required to overcome an obstacle situated at the outlet from the hypertrophied compartment; yet still the obstacle is but imperfectly overcome, and the force of the current of blood beyond the seat of obstruction is even less than in health. The necessity, therefore, of ascertaining the pathological states of remote as

well as of collatitious parts, in connexion with the actions and sounds of the heart, in order to arrive at correct conclusions as to the diseases of the latter, is manifest. The relations of morbid actions must be duly estimated, without assigning a preponderating or an exclusive share to one or two conditions, and overlooking all the rest. No partial or empirical views should be entertained; and far less ought a charlatan parade of examination be pursued and acted upon, to the neglect of physiological inquiry and of rational deductions. There is as much empiricism at the present day in the modes of investigating and observing diseases as in those of curing them; but there is this difference, that the empiricism of the former kind is much more *ad captandum* than the latter, and generally more fussy, and often more offensive.

27. iv. *Of the Nature and Arrangement of Diseases of the Heart.—A.* The *nature* of these diseases has been partially noticed when viewing the alterations of structure attending or consequent upon them (§ 23, 24). Of the intimate nature of these maladies we know nothing more than is intimated by function or action, or is made apparent on close inspection.—*a.* When disordered action is suddenly excited by mental emotions, or by affections of related parts, and as suddenly ceases, leaving the organ in the integrity of its functions, we infer that the disturbance is seated in, or extends to that part of the organic nervous system which actuates it; and this view is confirmed by the *juvantia* and *lædentia*, and often by the appearances observed after death in persons who had been thus affected, and who had died of other diseases. In these cases, the disorder must, in the present state of our knowledge, be viewed as purely *functional*, or *nervous*, or *dynamico-vital*, as termed by various writers; and it may, without much stretch of ingenuity, be chiefly referred either to impaired action or to excessive action. In these affections, the nervous system of organic life—particularly that part of it supplying the heart—is primarily disordered, and continues the only or chief seat of the disturbance for some time. But if either affection be excessive or enduring, then alteration of structure may result, and assume one or other of the forms about to be noticed.

28. *b.* Diseases of a most serious nature often attack the heart, in which, conjointly with more or less disturbance of the organic nervous influence, the vessels supplying one or more of the constituent tissues of the organ exert a morbid action, and give rise to various changes of structure, according to the grade of vital power, and to the state of the blood. These diseases frequently take place less obviously, or much more insidiously, than the foregoing, although often, also, in a severe and acute form; and they are always dangerous. The rapidity of their course, as well as the changes they produce, depends upon the intensity of the morbid vascular action, and the constitutional states just mentioned. From the circumstance of this action being attended by injection and development of the vessels, particularly of the capillaries, and giving rise to changes usually observed to follow inflammation in other parts similarly constituted, it has been denominated inflammatory. By this term, however, it is not intended to be implied that the morbid vascular action altogether consists either of diminution or of augmentation of the vital properties of the vessels; but that, as I have contended in the articles Disease (§ 87) and Inflammation, it is rather an *alteration*, a *perversion* of these properties that constitutes inflammation, and not a change simply *dynamic*; this change, whatever direction it may take, forming only one of the elements of the morbid state. Beyond this, we can hardly advance in our analysis of the nature of inflammatory diseases of the heart; but we may infer, with some truth, that, when the organic nervous or vital powers are unimpaired, and the blood uncontaminated, the morbid vascular action will partake more or less of the excited or sthenic condition, will exert a formative process, and will most probably form lymph, which will coagulate if allowed to remain for any time in contact with the part which produced it; or occasion thickening, or a condensation of the affected parts; or give rise to other changes varying with the grades of action; and we may farther conclude, with equal justice, that, when the vital powers are depressed or exhausted, or the blood altered or contaminated, the local morbid action will be asthenic, will be incapable of developing the changes just specified, and, in their place, will produce, according to its seat, a sanious or sero-sanguineous fluid from the surfaces, that will farther contaminate the blood, if the internal membrane be implicated, or give rise to softening, discoloration, &c., of the substance of the organ, if this part become affected.

29. *c.* Under the above two heads may be comprised those affections of the heart which may be said to be primary, as respects this organ, although they are often associated with, or even preceded by disorder of other viscera, as well as by alteration of vital power and of the circulating fluids. But there is another class of cardiac diseases which present different characters, and consist, in a great degree, of change of structure, often associated, however, with disorder of the organic nervous influence, and sometimes, also, with more or less marked alteration of vascular action in one or more of the constituent tissues, or compartments, of the heart. They may be said to proceed from the morbid conditions already discussed, especially when these exist in subacute, or in slight or chronic forms. That this is the case, will become apparent when I come to describe them individually. It will then be fully shown that impaired or irregularly exerted nervous influence, and morbid vascular action, in one or more of the constituent structures of the organ, have, together or singly, altered their nutrition, or impaired the vital cohesion of the molecules of which they are formed; and that the consequences of altered nutrition and impaired vital cohesion chiefly consist of the increased or diminished thickness and density, the augmented redness and elasticity, the softness, the dilatations, &c., of the parieties of the cavities; and of the fungous or polypous excrescences, the cartilaginous and osseous formations, and the different morbid productions, &c., found in the heart and pericardium.

30. *B.* Conformably with the above view of

the nature of affections of the heart, I shall divide them into, 1st. *Disorders which are merely nervous, or functional, and chiefly dependant upon the state or distribution of the ganglial nervous influence, particularly in respect of this organ;* and under this head will be comprised, (*a*) *Impaired and irregular actions of the heart;* and, (*b*) *Excessive action of the heart.*

2d. *Diseases in which, conjointly with more or less disturbance of the organic nervous influence distributed to this organ, the blood-vessels of one or more of its constituent tissues manifest a perverted or morbid action.* Under this division will be considered, (*a*) *Inflammation of the endocardium or internal membrane of the heart;* (*b*) *Inflammation of the pericardium;* and, (*c*) *Inflammation of the substance of the heart, or carditis.*

3d. *Organic or consecutive lesions of the heart, resulting from, and often associated with one or more of the above pathological conditions.* Under this head will be discussed, (*a*) *Atrophy of the heart;* (*b*) Œdema *of the organ;* (*c*) *Softening and hardening of the structure;* (*d*) *Adventitious productions in the heart;* (*e*) *Changes of the dimensions of the orifices and valves;* (*f*) *Changes in the dimensions of the cavities of the heart;* (*g*) *Hypertrophy of one or more of the compartments;* (*h*) *Rupture and wounds of the heart,* &c., &c.

31. v. *Of the Course, Termination, and Duration of Cardiac Disease.*—Affections of the heart may be *acute, sub-acute,* or *chronic.*—*A.* Those which are *nervous* or functional are most frequently chronic, remittent, or even periodic; yet they are sometimes acute, and of very short duration, as in cases of cardiac syncope, &c.; and frequently terminate without any lesion of structure, although they occasionally induce it.—*B. Inflammations* of one or more of the constituent tissues of the heart may assume any grade of intensity, and pursue, accordingly, an *acute* or *chronic* course, or even any of the intermediate or sub-acute states. The chronic form may be consequent upon the acute; or it, as well as the sub-acute, may appear primarily, especially when the inflammatory action is limited in extent, or is confined to a single constituent tissue of the organ. Although they may terminate in resolution, yet they most commonly give rise to organic changes, among which must be ranked the effusions of fluid, &c., frequently met with in the pericardium. The more intense states of inflammation of either of the surfaces, or of the substance of the organ, may terminate fatally in two or three days, while the less severe or chronic states may continue months, or even years; but when they become thus prolonged, it is generally owing to their having passed into organic change, or to a temporary subsidence of the morbid action, and to returns or exacerbations of it, under moral or physical influences.—*C. Organic lesions* of the heart are extremely uncertain as respects their course, duration, and termination. Even when most manifest and extensive, their symptoms and progress are by no means uniform; the most distressing phenomena, as in inflammations of the organ, often varying, disappearing, returning, or pursuing very different courses in separate cases, or even in the same person at different periods. They frequently, also, present more or less evident remissions and exacerbations, or even a marked periodicity. This circumstance probably induced Corvisart, and especially Rostan, to refer many cases of nervous asthma to organic disease of the heart. But this circumstance is explained by the fact already adverted to—that change of structure, even when most prominent, is only one of the elements of the cardiac malady, the organic nervous energy of the organ being also always more or less affected; and we know that intermittence, or periodicity, is characteristic of affections of the nervous system. The exacerbations or violent paroxysms which patients with organic lesions of the heart experience, is not, however, altogether owing to periodicity of the morbid action, but is often excited by mental emotions, by errors in diet, by overdistention of the stomach or colon, by neglect of the excreting functions, and by exposure to atmospheric vicissitudes.

32. vi. *The Complications of Diseases of the Heart* are important objects of consideration, in respect both of the associations of these diseases with one another, and of their connexion with other maladies.—*A. Nervous affections* of the heart are often attendant upon disorders of the digestive organs, on flatulency, on congestions of the liver, and on disorder of the respiratory functions. They are frequently, also, observed in the course of chlorosis, hysteria, and anæmia; and are often excited by affections of the womb, and by the puerperal states. Indeed, the numerous pathological causes (§ 20) of cardiac diseases form, also, complications with them.—*B. Acute or chronic inflammation* of the internal membrane of the heart sometimes extends to the pericardium; and inflammation commencing in the latter surface very frequently reaches the former. This association of inflammation of both surfaces, or extension of the morbid action from the one to the other, especially from the external to the internal membrane, is to be explained by the proximity of the one to the other in certain parts of the organ, and by the circumstance of the connecting cellular substance being frequently implicated, especially when the pericardium is inflamed. This fact, which is much insisted upon by Bouillaud, has been taught in my lectures since 1825.—*C.* Inflammations of these membranes are also often complicated with, or consequent upon acute articular rheumatism, or inflammation of the pleura or lungs. This association is met with in a very large proportion of cases of these diseases.—*D.* The complication of *organic lesions* of the heart with those of the large vessels, and particularly those of the aorta, are well known; and of softening, dilatation, &c., with adynamic fevers, scurvy, purpura, &c., has been often remarked. The connexion existing between obstructions at the orifices of the heart, and commencement of the large vessels, and hypertrophy; and between these and diseases in the lungs and brain, especially apoplexy, palsy, pulmonary hæmorrhage, effusion into the cavities of the chest, anasarca, &c., will be more fully shown in the sequel.

33. vii. *The Prognosis of Cardiac Diseases.*—Senac and Corvisart entertained the most unfavourable opinion as to the result in diseases of the heart. The latter writer even affixed the epigraph, "*Hæret lateri lethalis arundo,*" to

the title-page of his work. At the present day, more favourable ideas are entertained on this subject, although the opinion of Corvisart will still hold with respect to some of the organic changes of the organ.—*a.* The *nervous affections* of the heart will frequently yield to treatment, unless they be very violent, when an unfavourable, or, at least, a guarded prognosis should be given.—*b. Inflammations* of the membranes, and even of the substance of the heart, if they come early under treatment, will often terminate favourably; yet they ought, nevertheless, to be viewed as very dangerous maladies, as respects both the organic lesions they may cause, and the contingency of an immediate or sudden dissolution.—*c.* Most of the *organic lesions* of the organ are incurable; and yet the patient may live many years, when judiciously managed. Of this kind are, induration of the valves, narrowing of the orifices, chronic pericarditis, hypertrophy, &c. The unceasing functions of the heart, and their extreme importance to the economy, however, render diseases of it more dangerous than those of almost any other organ. But the advances that have been recently made in their diagnosis have given greater precision to the treatment, and have, consequently, afforded a greater degree of success than formerly.

34. viii. *The Treatment of Cardiac Affections.*—*A.* The *nervous affections* of the heart, especially those associated with disorder of the digestive and assimilative organs, or characterized by irregular or excessive action, have been too generally, and most injuriously treated by vascular depletions and purgatives. I have seen even the complication of palpitation with chlorosis treated by depletions, and a complete state of anæmia result. In cases of this kind, a judicious selection of tonics, chalybeates, anodynes, and stomachic aperients, appropriately to the peculiarities of each, aided by light, nutritious diet, by gentle exercise in an open dry air, and sometimes by tonic and alterative mineral waters, will generally remove the complaint.

35. *B.* The *inflammatory diseases* of the heart require more or less copious and repeated depletions; in the acute stage, the most decided adoption of them, as well as of other antiphlogistic means. M. Bouillaud has strongly insisted upon the propriety of prescribing repeated blood-lettings; but although the depletions he recommends are considered large in France, they are not larger than those usually directed in this country for the same diseases. The exhibition of calomel and opium, or of calomel, antimony, and opium, in repeated doses, to promote the resolution of the inflammatory action, or to prevent it from passing into the chronic state, or from terminating in effusion, or to limit the effusion of lymph, or to prevent the organization of what may have been effused, and promote its absorption, is the next most important means, and should always follow immediately after a decided vascular depletion, in the manner described in the article Blood (§ 64–68). This practice, somewhat modified from that adopted by British medical practitioners in warm climates, was first brought into use in this country by Dr. Hamilton, of Lynn Regis (*Medical Commentaries*, &c., vol. ix., p. 191. Lond., 1785). His paper on this subject—the most valuable in modern medical literature—contains all the modifications that have been attempted in this practice by Dr. Armstrong and other more recent writers, with the view of appearing original. It has been erroneously stated, by several who have adopted this treatment, that Dr. Hamilton always prescribed these medicines until the gums were affected by them; and it has been claimed as a point of originality that they have employed the same means, so as not to produce, or short of producing this effect. In some complaints, however, and even in some of those under consideration, this effect is necessary to the successful operation of these substances. That Dr. Hamilton, however, thought it unnecessary to employ them, in certain diseases, as rheumatism, &c., so as to affect the mouth, is shown by his remarks respecting their operation (*Opus citat.*, p. 200). He there states that, when they act upon the skin or bowels, relief will accrue from them without the mouth becoming affected; and that, when the skin is dry, hot, or contracted, emetic tartar should be added to the calomel and opium, in order to determine to this surface.

36. When inflammations of the heart come under treatment at a more advanced stage, or when they have assumed a more chronic form, vascular depletions must be prescribed with greater caution, and the calomel and opium should be given until either the gums become affected or a slight ptyalism be produced. If the action of the heart be irregular or excited, a small quantity of camphor may be added to each dose of these medicines; and if the pulse be hard and regular, a repetition of the blood-letting, and a combination of James's powder, or of tartar emetic, or of ipecacuanha, with the calomel and opium, will act beneficially, both upon the circulation and upon the emunctories. The bowels should be kept freely open, and the action of aperients promoted by enemata.

37. Although it is necessary to have recourse to copious depletions in the acute or early stage of inflammations of the heart, yet their effects should be carefully watched; and they ought to be still more cautiously employed in chronic or advanced cases; for there are very few inflammatory diseases in which they may prove more beneficial than in these, if they be resorted to at the proper time, and in sufficient quantity; or in which they may be more injurious, if too long delayed, or too sparingly employed, or carried too far. When prescribed in a timid manner, and if a decided use of calomel and opium, sometimes with antimony, colchicum, or other adjuvants, be not adopted, an acute inflammation, which would otherwise have entirely subsided, either passes into a chronic state, or gives rise to organic changes imbittering the shortened period of future existence. Yet, while thus prompted to decision, it must never be overlooked, that in most cases of inflammation affecting this viscus, the organic nervous energy is more or less impaired or irregularly determined; and that the most decisive measures should, therefore, be directed with the utmost circumspection. The other means which may be brought in aid of those already noticed are comparatively of so little importance, and require to be so varied according to the forms and stages of the disease, that no men-

tion need be made of them until the specific affections of the organ come under consideration.

38. *C.* The *organic lesions* of the heart require a much more prudent recourse to depletions than the diseases just dismissed, inasmuch as the nervous influence, especially that actuating the organ, is much more impaired in the former maladies than in the latter. In cases of dilatation of one or more of the cavities, even a moderate depletion may be followed by a fatal result; and when there is hypertrophy the heart requires all the energy it possesses to overcome the obstacle in the way of the circulation. The small but repeated depletions, and the antiphlogistic regimen recommended by Valsalva and Albertini, and so generally adopted in organic diseases of the heart, may be carried too far, as Corvisart has judiciously shown. They may be even most injurious. There are few means which are universally or even generally applicable to these lesions, excepting mental and physical quietude, and attention to the digestive and excreting functions. Vital energy seldom admits, in them, of being lowered; and whatever acts in this manner should be employed with discrimination, or appropriately to those states which seem specially to require it. In them, also, moral training, attention to diet, living in an equable temperament, and in a healthy and airy situation, a gently open state of the bowels, and a due secretion of bile, and the careful avoidance of whatever excites or aggravates the disorder of the heart, are among the most generally applicable means of treatment. Numerous other measures may be employed, but they are applicable only to particular lesions, and therefore will be mentioned where the treatment of these lesions is particularly discussed.

Bibliog. and Refer.—*Galen*, De Locis Affect., l. v., c. 2.—*Aëtius*, Tetrab. i., sect. iv., c. 77.—*Avicenna*, Canon., tract. iii., fen. ii., tract. i., c. 2.—*B. Montagnana*, Cons. de Ægritud. Cordis, in Op. Sel., fol. Ven, 1497.—*C. Vega*, De Cord. et Thoracis Affect., in Arte Med., fol. Lugd. Bat., 1564.—*C. Bruno*, De Corde et ejus Vitiis., 4to. Bas., 1580.—*E. Rudius*, De Nat. et Morbosa Cord. Constitutione, 4to. Venet., 1600.—*A. Albertini*, De Affect. Cordis Libri Tres., 4to. Venet., 1618.—*C. Tardy*, Traité de la Monarchie du Cœur en l'Homme., 4to. Paris, 1656.—*A. Bulgetius*, De Affect. Cordis., 4to. Pat., 1657.—*Sennertus*, Praxis, l. ii., par. iii., c. 3.—*A. Kramer*, Diss. de Morbis qui Cor et Respirat. Organa infestant., 4to. Vien., 1716.—*M. Martinez*, Observat. Raræ de Corde, 4to. Madr., 1723.—*J. M. Lancisi*, De Motu Cordis et Aneurismatibus, fol. Romæ, 1728.—*M. Berbeyrac*, Nouv. Dissert. sur les Maladies de la Poitrine et du Cœur, 12mo. Amst., 1741.—*J. Senac*, Traité de la Structure de Cœur, et de ses Maladies, 2 tomes, 4to. Paris, 1749.—*J. F. Meckel*, Sur les Mal. du Cœur, in Mém. de l'Acad. de Berlin, 4to. Berl., 1759.—*A. Matanus*, De Aneurismaticis Præcordiorum Morbis, 4to. Liburn., 1761.—*H. Mason*, Lectures upon the Heart, &c., 8vo. Read., 1763.—*C. F. Juncker*, Diss. Cordis Morb. propriis in Tabula exhibens, 4to. Halæ, 1763.—*A. le Camus*, Maladies du District du Cœur, 12mo. Paris, 1772.—*Spaventi*, Diss. de Frequentioribus Cordis Morbis, 4to. Vien., 1772.—*J. J. Neifeld*, Ratio Medendi Morbos Circuli Sanguinei, 8vo. Breslau, 1773.—*F. Petraglia*, De Cordis Affectionibus Syntagma, 8vo. Romæ, 1778.—*C. F. Michaelis*, Aneurism. Cord. Disq., in *Doering*, Tract., vol. i.—*J. G. Walther*, in Nouv. Mém. de l'Acad. des Sc. à Berlin, 4to. Berlin, 1785.—*Odier*, Manuel de Médecine Pratique, p. 151, 336.—*J. C. Reil*, Dissert. Anal. ad Hist. Cordis Pathologicam, 4to. Halæ, 1790.—*A. Portal*, Anatomie Médicale, t. iii., 8vo. Paris, 1804.—*Cabirau-Cabannes*, Aperçu sur quelques Affect. Organiques du Cœur, &c., 8vo. Paris, 1805.—*J. N. Corvisart*, Essai sur les Maladies du Cœur et des gros Vaisseaux, 8vo. Paris, 1806, 3d ed., 1818, translated by *Heb*, 8vo. Lond., 1813.—*M. A. Petit*, Essai sur la Médecine du Cœur, 8vo. Lyon., 1806.—*Contelle*, Essais sur quelques Causes de Mal. du Cœur, 8vo. Paris, 1808.—*A. Burns*, Observations on some of the most frequent Diseases of the Heart, 8vo. Edin., 1809.—*P. J. Pelletan*, in Clinique Chirurg., 8vo. Paris, 1810.—*A. Testa*, Delle Malattie del Cuore, 3 vols., 8vo. Bologn., 1811.—*J. Gates*, On Diseases of the Heart, 8vo. Philadelphia, 1812.—*Le Gallois* et *Merat*, in Dict. des Sciences Méd., t. v., 8vo. Paris, 1813.—*F. L. Kreysig*, Die Krankheiten des Herzens, &c., 4 bde., 8vo. Berlin, 1814–17.—*L. P. Lukomski*, De Statu Militum Morbis Cordis gignendis Idonea. Wien., 1815.—*J. H. James*, in Trans. of Med. and Chirurg. Society, vol. viii., p. 434.—*J. C. Wetzler*, Ueber Krankh. des Herzens, in Beyträge zur Medicin, b. i.—*H. Reeder*, A Pract. Treatise on Dis. of the Heart, 8vo. Lond., 1821.—*Béclard* et *Chomel*, Dict. de Méd., t. v., 8vo. Paris, 1822.—*M. Fodéré*, in Journ. Complément. du Dict. des Sc. Méd., t. xxxii. et xxxiv.; et *J. Johnson's* Med. Chirurg. Rev., vol. ii., p. 417.—*Hufeland*, in Nouv. Journ. de Méd., t. xiv., p. 204.—*J. Johnson*, in Trans. of Med. and Chirurg. Soc., vol. xiii., p. 212; and Med.-Chirurg. Rev., Nos. 38, 39, No. 43, p. 231.—*J. Abercrombie*, Trans. of Méd.-Chirurg. Soc. of Edin., vol. i., part i. Edin., 1824.—*Wishart*, in Ibid., vol. iii., p. 195.—*R. J. Bertin*, Traité des Maladies du Cœur, 8vo. Paris, 1824.—*H. Bürger*, Diagnost. der Hertzkrankheiten, 8vo. Berlin, 1825.—*C. H. Parry*, Collect. from his unpubl. Writings, &c., vol. ii., 8vo. Lond., 1825.—*G. Andral*, Clinique Médicale, &c., t. iii. Paris, 1826, translated by *G. Spillan*, part ii., p. 217. Lond., 1835; et Précis d'Anat. Pathologique, t. ii., 8vo. Paris, 1829.—*F. Hawkins*, Rheumatism and some Diseases of the Heart considered, 8vo. Lond., 1826.—*R. Adams*, in Dubl. Hosp. Reports, vol. iv., p. 353.—*J. Brown*, Medical Essays on Fever, Diseases of the Heart, &c., 8vo. Lond., 1828.—*P. M. Latham*, in London Med. Gazette, vol. iii., p. 2, *et pass.*—American Journ. of Med. Sci., vol. vi., p. 129.—*J. Elliotson*, On the Recent Improvements in distinguishing Diseases of the Heart, fol. Lond., 1830.—*J. Bouillaud*, Dict. de Méd. et Chirurg. Prat., t. v.—*J. Hope*, Treatise on Diseases of the Heart, &c., 8vo. Lond., 1832; and Cyclop. of Pract. Med., vol. ii.—*T. Davies*, Lectures on the Diseases of the Lungs and Heart, 8vo. Lond., 1835.—*J. Bouillaud*, Traité Clinique des Maladies du Cœur, 2 tomes, 8vo. Paris, 1835.

III. Of Nervous or Functional Affections of the Heart.

i. Of Impaired or Irregular Action.—Classif.—I. Class, III. Order (*Author*).

39. Defin.—*The action of the heart more or less weakened or irregular, with faintness or depression, and often with disorder of the digestive organs.*

40. The functions of the heart may be imperfectly performed in two principal ways: 1st. They may be simply weakened, but in every grade, until they become extinct, and yet structural lesion may not be detected to account for the circumstance; 2d. They may be impaired or enfeebled, with more or less irregularity of the contractions, and yet no organic change may exist, the impaired and irregular action occurring only temporarily. One of the most familiar forms in which this affection presents itself is that of fainting or syncope. But in this the heart is not always primarily affected.—*A. Simply Enfeebled Action of the Heart*, depending upon deficient energy of the cardiac ganglia, may proceed from whatever depresses the organic nervous influence, or from inanition or anæmia. It may also be sympathetic, or the result of a derivation of the vital influence to different organs, as during certain periods of impregnation. The causes, pathological states, the diagnosis and treatment of this affection, are fully described under the article Fainting.

41. *B. Enfeebled and Irregular Action of the Heart* is a common affection in its slighter grades. The pulsations may be unequal in frequency and power, or they may be intermittent, reiterated, or fluttering. This state of action, although attending various dangerous diseases of the organ, may be entirely nervous, or connected with depressed organic nervous power and enfeebled function of the stomach and liver. In this latter case, especially, it is often induced by flatulence, particularly when the flatus rises into the œsophagus and is retained

there by spasm of the canal. It also may proceed from mental emotions, or from whatever overloads the cavities of the heart, or interrupts the return of blood from the lungs, or causes congestion of the left auricle and pulmonary veins.

42. *C. Treatment.* — Unless it is attended with a sense of sinking, or oppression, or anxiety at the præcordia, this affection requires only attention to the digestive, assimilating, and excreting functions, and to diet and regimen. But if these symptoms are present, restoratives, especially camphor, the preparations of ammonia, the æthers, carminatives, and tonics conjoined with either of these will often be necessary. Much advantage will also result from taking a digestive pill (F. 507, 562) at dinner or bedtime. A small or moderate bloodletting is not infrequently prescribed in cases of this kind with the view of removing congestion of the heart or large vessels. When the patient is plethoric, or when the irregularity is consequent upon the suppression of an accustomed evacuation, or of congestion of the portal system, this practice is judicious, if cautiously resorted to. In the latter circumstances, the application of a few leeches around the anus will often be of service. The bowels ought also to be freely acted upon by deobstruent and mild purgatives. In these cases, although there may be vascular plethora, or local congestion, nervous or vital power is, at the same time, more or less impaired, and therefore the means of restoration just mentioned should also be employed. The treatment about to be advised for palpitations (§ 50) is often, also, appropriate in this affection. When enfeebled and impaired action of the heart occurs in gouty persons, or appears as *misplaced* or *retrocedent* Gout, the means advised under such circumstances in that article (§ 83, 89) should be prescribed.

ii. Excited Action of the Heart.—Syn. Καρδιωγμος, Hippocrates, Galen; *Cordis Palpitatio, seu Pulsatio, Palmus* (παλμος, a beating or palpitation); *Cardiopalmus*, Swediaur; *Tremor Cordis, Palpitatio*, Cullen, et Auct. var.; *Palmus Cordis*, Young; *Clonus Palpitatio*, M. Good; *Palpitation, Palpitation du Cœur*, Fr.; *Das Herzklopfen*, Germ.; *Palpitazione*, Ital.; *Palpitation, Palpitation of the Heart.*

Classif.—2. *Class*, 3. *Order* (*Cullen*). 4. *Class*, 3. *Order* (*Good*). II. Class, I. Order (*Author*).

43. Defin.—*Strong, frequent, or tumultuous action, with an increase of the impulse and natural sounds of the heart, so as to be sensible, and often distressing to the patient, without appreciable lesion of the structure of the organ.*

44. *A. Palpitations* are either *nervous* or *functional*, or *symptomatic* of some one of the more serious diseases of the heart hereafter to be considered. The former only of these fall under discussion at this place. Nervous palpitations may be either *primary*, and depending upon excitement of the nerves of the heart, without manifest disorder of other viscera, as in attacks induced by moral emotions, or *sympathetic* of affections of remote or related organs. They are often sudden in their accessions, but more rarely so in their subsidence. The sounds of the organ are generally increased during their continuance; and the first sound is farther augmented by the impulse or shock against the ribs occasioning a distinct knock, which may be sometimes heard at a short distance from the patient. They are also occasionally attended by a slight bellows sound, which always disappears when the heart resumes its natural action. Nervous palpitations are often accompanied with uneasiness and slight anxiety at the præcordia; and sometimes, also, with a sense of sinking, or faintness, with which they not infrequently alternate.

45. *B.* The *Causes* differ much in their natures, or modes of operation, and modify, accordingly, the characters of this affection. The nervous and irritable temperaments, early age, debility, in whatever way induced, venereal excesses, and mental exertion, remarkably *predispose* to this disorder. The *exciting causes* are, 1st. The more active mental emotions, as fright, anger, joy, &c.; also sadness, anxiety, melancholy, nostalgia, longings after objects of affection, excitements of the imagination, &c.; 2d. The abuse of spirituous liquors and muscular exertions, or whatever accelerates the return of blood to the right side of the heart, and over-distends the large veins and auricles; 3d. Excessive or debilitating discharges; the abstraction of a natural or necessary stimulus; sexual excesses, or manustupratio, this last being the most common and influential of the exciting causes; 4th. Inanition from deprivation of the necessary nourishment, or from impaired assimilation, or from excessive waste of the secretions, or circulating fluids, as in the palpitations associated with chlorosis and anæmia, or consequent upon depletions; 5th. Pressure on the large vessels, occasioned by strait lacing, by pregnancy, by abdominal tumours, effusion, &c.; 6th. Enfeebled action of the digestive functions, particularly when attended by flatulency and torpor of the liver, or constipation of the bowels; 7th. The irritation of worms in the intestinal canal, in connexion with debility, &c.; 8th. Hysteria in several of its Protæan forms, especially when the uterine functions are disordered, and the catamenia either excessive or obstructed; 9th. Irritation of the spinal chord, or of its nerves, or excitement of the uterus or ovaria acting upon the heart, either directly by the great sympathetic nervous system, or mediately through the spinal chord, the irritation propagated to this latter being reflected from it along the branches communicating between it and the cardiac and other sympathetic ganglia.

46. Although these may be considered the principal causes, yet others sometimes produce functional palpitation, especially several *antecedent disorders* and organic lesions; as, *a.* Adynamic and nervous fevers; *b.* General plethora by overloading the auricles and large vessels; *c.* Irregular or misplaced gout, occasioning irritation of the cardiac nerves, or congestion of the large vessels or cavities of the viscus; *d.* Obesity, particularly in connexion with plethora; *e.* Obstructed circulation through the lungs, owing to diseases of their structure, or to effusions of fluid pressing upon them, or other causes preventing their expansion; *f.* Enlargements of the abdominal or pelvic viscera, or effusions into the peritoneum, preventing the easy descent of the diaphragm, or pressing

upon that part connected with the pericardium, as enlarged or engorged liver or spleen, pregnancy, ascites, &c.

[To these may be added a diminution of the blood, characterized by a diminution in the proportion of the globules. This deficiency in one of the most important elements of the blood indicates a feebleness of constitution, which must generally be remedied by pure air, nutritious food, and the ferruginous preparations. Andral supposes that it is by diminishing the globules that bleeding and low diet produce such great disturbance of the nervous functions and lead to palpitations of the heart, although he does not maintain that all the neuroses are characterized by such a condition of the blood. These palpitations, in anæmic and chlorotic individuals, from impoverishment of the blood, are often confounded with palpitations from an organic cause, and will often require all the judgment and acumen of the most experienced observer to discriminate between them.]

47. *D. Course and Duration of Nervous Palpitation.*—*a.* This affection varies somewhat, according to the cause which produced it.—*a.* When it proceeds from *mental emotions*, it is often violent, but of very short duration.—*β.* When it arises from *manustupratio*, it is not so excessive, but it is more prolonged, or remittent or recurrent.—*γ.* Palpitations *sympathetic of dyspepsia* are seldom severe, unless in persons of the nervous or irritable temperaments, nor of long duration; but they are readily excited, particularly by a full meal, or by indigestible, or flatulent, or fluid food. In such cases the action of the heart is irregular, as well as excessive, tumultuous or fluttering, and attended by anxiety, sometimes by pain, and by accelerated breathing or dyspnœa.—*δ.* When this affection proceeds from *misplaced* or *retrocedent gout*, it is generally severe; more, however, from the attendant sensations than from the violence of the palpitations. The action of the heart is excessive, most irregular, or tumultuous, and attended by distressing anxiety, or sense of sinking or of anguish at the præcordia, often extending to the epigastrium, and by extreme restlessness, and a feeling of impending dissolution.—*ε.* Palpitation is very often *an attendant of hysteria*, and in this case is excited or aggravated by the globus hystericus, or by the borborygmi or intestinal flatulence, characterizing the latter affection. A feeling of strangulation frequently accompanies this form of palpitation; and, in two or three instances, I have observed an almost sudden swelling of the thyroid gland to take place, this part returning to, or nearly to its former state very soon after the attack. In more than one of these cases there was evidence of co-existent irritation or excitement of the uterine organs. Hysterical palpitation sometimes alternates with faintness, or is connected with excessive menstruation. It occasionally, also, follows abortions, floodings, &c.—*b.* The *Duration* of palpitation is most indefinite. It may continue only a few minutes, or many days. It may be remittent, intermittent, or even periodic; but its course is more generally irregular.

48. *E. Diagnosis.*—It is often easy to distinguish nervous palpitation from that symptomatic of organic lesion; but quite as often the diagnosis is very difficult. That it should be made with accuracy is most important, as respects both the treatment and the immediate happiness of the patient; for many distress themselves and aggravate their complaints with fears of an organic malady, while they are affected only with functional disorder. When nervous palpitations are prolonged, remittent, or return frequently, and are severe, the diagnosis is generally difficult; if attempted during their continuance, it is still more so; and if deferred until the period of intermission, it is often not much less difficult; for some organic lesions occasionally present periods in which the symptoms are remarkably ameliorated. Yet an attentive examination of the whole chest by percussion, auscultation, by the eye, and by the touch, will generally determine the question with great accuracy, and show that, in this affection, the heart is not enlarged, and that the blood circulates freely through its various orifices. The extended dulness on percussion, the morbid or adventitious sounds, the more or less constant dyspnœa, the venous congestions, the bloated state of the countenance, the dropsical effusions, &c., sufficiently mark organic lesion of this organ, especially if it have become far advanced. Sometimes, however, great nervous sensibility, or an hysterical affection, may be attendant upon some degree of alteration of structure, the palpitation recurring in severe paroxysms after slight mental emotions, or other causes affecting the nervous system, and leaving the patient comparatively easy, and with few precise or well-marked symptoms in the intervals. This is not infrequently observed in persons who have been subjects of inflammation of one or more of the constituent tissues of the heart, that has left behind it slight structural change in connexion with an irritable state of the organ, and great susceptibility of the nervous system.

49. In addition to these considerations, the following circumstances may be adduced as distinctive of a functional disorder: 1st. The general prevalence of nervous symptoms, and the recurrence of the attack from causes acting on the nervous systems; 2d. The return of the affection when the patient is quiet, and the relief following gentle or moderate exercise in the open air, and the means used to improve the digestive functions and to restore the nervous energy; 3d. The prolonged and complete intermissions during an improved state of the general health, and the exacerbations consequent upon whatever depresses or exhausts organic nervous power, especially upon the operation of any of the causes enumerated above (§ 45, 46); and, 4th. The absence of the physical signs characterizing any of the inflammatory and structural diseases about to be considered.

50. *F. Treatment.*—*a.* The means prescribed for this affection should have a very strict reference to the causes which produced it, and especially to the pathological state of which it is sympathetic. If it be independent of vascular plethora, or of disease of remote organs; if it be primary, and the consequence of enfeebled or exhausted nervous influence, or of *inanition*, *anæmia*, *chlorosis*, &c., chalybeates, tonics, and restoratives, regular exercise in the open air, change of air to the seaside, the use of the tepid or cold bath, sea-bathing, light and nutri-

tious food, an infusion of green tea,* early hours, and healthy employment, the bowels being regulated, or preserved open by an occasional dose of a mild stomachic purgative, or by a tonic, carminative, and purgative conjoined, are the most appropriate remedies. For persons who are of an irritable or nervous temperament, or who cannot bear the immediate use of chalybeates, the stomachic bitters, or vegetable tonics, with the alkaline carbonates, or the preparations of ammonia, will be most serviceable; and afterward quinine with sulphuric acid, and æther, or with camphor, or the decoction of bark with the hydrochloric acid and chloric æther; and, lastly, the metallic salts, especially the sulphate of zinc, or of iron, or the nitrate of silver, may be prescribed. I have for many years employed the nitrate of silver, triturated with the extract of hyoscyamus, with great benefit in this affection, as well as the sulphate of zinc similarly combined. The various strengthening mineral waters, and amusements in the open air, will also prove beneficial.

51. *b.* When palpitation proceeds from *masturbation*—a more prevalent vice than is generally supposed—the preparations of iron, with camphor; the tincture of the sesqui-chloride of iron; the tonic infusions or decoctions, with the alkaline carbonates, with the solution of potash, or with Brandish's alkaline solution; soda water or Seltzer water as a common beverage; early rising, and regular exercise in the open air, will be found the most useful means of cure; but they will all fail if the cause still continues.—*c.* Palpitation in connexion with *plethora* requires a moderate bloodletting, which may be repeated in some instances; a restricted and chiefly farinaceous diet, and the daily use of stomachic or mild purgatives, early rising, and regular exercise. This form of the affection is not uncommon during the early months of *pregnancy*, and may be treated by the means just named.—*d.* When this affection is symptomatic of *dyspepsia*, the treatment must depend upon the state of the vascular system. If this system be plethoric, then the remedies now specified should be prescribed, the excreting functions freely acted upon, and the biliary secretions promoted. (See Indigestion.)—*e.* The palpitations arising from *gout* are generally relieved by camphor conjoined with acetate or hydrochlorate of morphia, or with hyoscyamus, and by a copious action of the bowels procured by warm stomachic purgatives, with which magnesia or the alkaline subcarbonates may be conjoined. In this, as well as in the dyspeptic form of palpitation, I have seen much benefit accrue from the hydrocyanic acid, given three times a day in a tonic infusion, an absorbent and carminative tincture being added; but the bowels should previously be well evacuated. (See art. Gout, § 86.)

52. *f. Hysterical palpitations* require, according to the degree of plethora, or of inanition, nearly similar means to those already mentioned, and attention to the uterine functions. The bowels should be kept open by cooling aperients; and, if there be much debility, tonic infusions, with the hydrochlorate of ammonia, or nitrate of potash, or carbonate of soda; the infusion of valerian, with the fœtid spirit of ammonia, &c., and other remedies enumerated in the article Hysteria, may be directed, according to the pathological peculiarities of the case. The existence of pain or tenderness in any part of the spinal column should also be ascertained in this form of the affection; and, if either be present, the means calculated to remove it ought to be resorted to.—*g.* When palpitation depends upon *chlorosis* or *anæmia*, a combination of the sulphate of iron with aloes and an aromatic powder, in the form of pills, is generally of service. I have seen great benefit derived from one or two grains of the sulphate of iron, with three of the aloes and myrrh pill, and an equal quantity of the extract of conium, given twice or thrice daily. The formulæ, also, in the *Appendix* (F. 519–525) will prove equally serviceable.—*h.* In the palpitation connected with *chronic bronchitis*, or with *asthma*, an infusion or decoction of senega, with aromatics and anodynes; camphor, asafœtida, and other remedies advised in these articles, are indicated.—*i.* When this affection is caused by *intestinal worms*, or by *enlargement* of any of the *abdominal* or *pelvic viscera*, or by *ascites*, or by *effusion* into the *pleural cavities*, the treatment should be chiefly directed to the removal of these maladies.

Bibliog. and Refer.—*Aëtius*, Tetrab. ii., serm. iv., c. 58.—*Avicenna*, Canon., l. iii., fen. ii., tract. 2, c. 1.—*Langius*, Opera, Epist., l. i., 22; l. iii., 2.—*Calani*, Comment. in *Galenum* de Cord. Tremore. Lugd. Bat., 1538.—*B. Patini*, Consilium pro Maximiliano Cæsare de Cord. Palp., 8vo. Brix., 1575.—*A. Camutius*, Excussio brevis præcipuè Morbi, nempe Cordis Palp., &c., 8vo. Flor., 1578.—*A. Victori*, De Palp. Cordis, 4to. Romæ, 1613.—*S. Pissinius*, De Cordis Palpitatione cognosc. et curanda, Libri duo, 12mo. Franc., 1609.—*Crocius*, Quæst. Med de Palp. Cordis Natura et Curatione. Marb., 1622.—*Hollerius*, De Morbis Internis, l. i., c. 29.—*Horstius*, Opera, vol. ii., p. 137, 139.—*Schenck*, l. ii., obs. 211.—*Tulpius*, l. i., c. 15.—*Zacutus Lusitanus*, Prax. Hist., l. ii., c. 8; l. v., c. 2; l. viii., c. 30 (*Directs issues*).—*Ten Rhyne*, Febr. Cardiaca et Palpitatio Cordis ex Flatibus, in *Haller's* Biblioth. Med. Pract., vol. iii., p. 256.—*Riverius*, Observ. Med., cent. iv., n. 21, &c.—*Lentin*, Beyträge, b. iv., p. 415.—*Tralles*, De Usu Opii, sect. iii., p. 165.—*F. Hoffmann*, Opera, vol. iii., p. 90.—*Lancisi*, De Subitaneis Mortibus, p. 60.—*Senac*, Traité du Cœur, l. vi., c. 9.—*Reil*, Memorab. Clin., vol. i., fasc. ii., p. 5.—*Baldinger*, N. Magazin, b. v., p. 485 (*Palp. caused by worms*).—*Odier*, in Journ. de Médecine, t. lxviii., p. 49 (*The nitrate of bismuth advised for palp.*).—*Lettsom*, Mem. of Med. Soc. of London, vol. i.—*Marcard*, Beschreibung von Pyrmont, b. ii., p. 205.—*J. A. Albers*, Ueber Pulsat. im Unterleibe, 8vo. Bremen, 1803.—*J. P. Frank*, Acta Institut. Clin. Viln., ann. i., p. 125.—*Lentin*, in *Hufeland's* Journ. der Pract. Heilk., b. xiii., st. iv., p. 7.—*Conradi*, in Ibid., b. vi., p. 501.—*Michaëlis*, in Ibid., b. xviii., st. iii., p. 62 (*Draughts of cold water for palp.*).—*Brugnatelli*, Giornale, Ann. viii., t. i., n. 8 (*Nitre with tonics*).—*Laennec*, Auscult. Médiate, t. ii., p. 227. Paris, 1829.—*A. Portal*, Mém. sur la Nature et Traitement de plusieurs Maladies, t. iv., p. 173. Paris, 1819.—*Merat*, in Dict. des Sciences Médicales, t. xxxix., p. 134.—*J. Johnson's* Med.-Chirurg. Rev., vol. iv., p. 370; vol. v., p. 277.—*Andral*, Dict. de Médecine, t. xvi., 8vo. Paris, 1826.—*J. Frank*, Praxeos Medicæ Universæ Præcepta, vol. ii., pars ii., sect. ii., p. 370.—*J. Hope*, Cyclop. of Pract. Med., vol. iv., p. 232.—*J. Bouillaud*, Traité Clinique sur les Mal. du Cœur, t. ii., p. 486.

iii. Painful or Neuralgic Affections of the

* In the summer of 1820, I was requested by a practitioner to see the daughter of a clergyman residing in Westminster, labouring under most violent nervous palpitations, which had resisted the means advised by several physicians who had been consulted. She was in bed; and the impulse of the heart moved the bed-clothes, so that the pulse could be counted by the eye at the farthest part of the room; and the knock of the heart against the ribs could be heard at the distance of some feet. She was thin, delicate, and highly nervous. Finding that the usual remedies for nervous palpitation had been prescribed without any relief, I suggested that a strong infusion of *green tea* should be given three or four times a day, and continued for a few days. Relief immediately followed, and perfect recovery in two or three days.

Heart.—Classif. II. Class, I. Order (*Author*).

53. Charact.—*Sudden attacks of anguishing pain in the cardiac region, returning at intervals; the actions and sounds of the heart and respiration being but little affected.*

54. In the same category with the disorders just considered may be arranged those painful affections which have been considered as neuralgia of the heart. They might be viewed as modifications of Angina Pectoris, and arranged with it, if there were sufficient evidence to prove that they are actually seated in the nerves of this organ. But, as Bouillaud observes, although the functions of the heart may be disordered in connexion with them, the nerves of the adjoining viscera and structures are probably as much affected as those of the heart. A case of this complaint has been described by Dr. Elliotson, and is altogether similar to some that have occurred in my practice. Indeed, *neuralgia* of the cardiac and communicating nerves, or affections intermediate between it and *angina pectoris*, are by no means rare. A case of this affection came under my care in 1821; and since then I have treated six similar cases: two in females between the ages of twenty-five and thirty, three in gentlemen somewhat upward of fifty, and a sixth in a physician of about thirty-five years of age.

55. *A. Diagnosis.*—According to the phenomena observed in these cases, this complaint is characterized as follows: A most acute, lancinating, and anguishing pain is felt to the left of the sternum, darting through the region of the heart, often from under the left nipple backward to the spine or left shoulder-blade. Sometimes it is confined to this organ; and occasionally it extends to the left brachial plexus, and up the left side of the neck, or left arm, or to other parts in the vicinity of the heart. This complaint is generally intermittent, or remittent, or even periodic in its character; the paroxysms are sudden or almost instantaneous in their accession, and their duration is very variable. They leave the patient intervals of comparative ease, when the pain is dull or aching, and confined to the region of the heart. They return at various intervals, sometimes once or twice in the day, and occasionally not for several days. They are attended by the utmost agony and distress. The actions of the heart are somewhat accelerated during the fit, and sometimes more or less irregular or turbulent; but they are also in other instances nearly natural. There is no morbid sound, beyond a slight bellows sound in a few cases, heard on auscultation, and the breathing is tranquil. The paroxysm may take place at any period, and when the patient is perfectly quiet, mentally and physically, and without the occurrence of any cause sufficient to account for the seizure. This affection does not appear to be aggravated, or its attack to be favoured, by exercise, or by motion or position; but, on the contrary, it seems to be benefited by gentle exercise in the open air. Debility and loss of flesh generally are induced by the excessive suffering; but the appetite is not materially impaired. The powers of digestion are, however, weakened, and the bowels are more or less sluggish. This complaint is generally of long *duration*. The shortest period in my cases was six or seven months; and in one, where the intervals between the attacks were very considerable, it was as many years.

56. *B. Causes.*—Of the six cases above referred to, two were females. They were both unmarried; but the catamenia were perfectly regular; and neither of them had ever complained of any hysterical symptom, or had experienced pain in the spine. Of the four males, the two most advanced in life had formerly had gout; and in one of them, who was under the care of Dr. Roots and myself, the cardiac neuralgia was induced by grief. The other two were medical practitioners: one of them had been engaged in a laborious practice in the country; the other had experienced family contrarieties and disappointments, and was endowed with the utmost susceptibility and irritability. The recurrence of the attack seems to be favoured by cold, especially by cold east winds; and there is reason to believe that malaria is concerned in causing it. In a violent case, recorded by M. Andral, no trace of organic lesion was observed on dissection.

57. *C. Treatment.*—The means of cure in this affection are not materially different from those advised for Angina Pectoris, to which it is an intimately allied affection. As in that complaint, so in this, and in Palpitations (§ 50), the indications are, 1st. *To shorten the attack*; 2d. *To prevent the recurrence of it.*—*a.* The remedies I have found most efficacious in fulfilling the *first intention* are, *camphor* in large doses with *opium*, or acetate of morphia; the *hydrocyanic acid*, with camphor, or ammonia, or other stimulating antispasmodics, or warm carminatives and tonics; a full dose of *calomel*, with camphor, *capsicum*, and opium, or the hydrochlorate of morphia; the preparations of *colchicum* conjoined with ammonia, camphor, the carbonate of soda, &c.; a *mustard poultice* applied as hot as it can be endured over the epigastric region; and a plaster, consisting chiefly of extract of *belladonna* and camphor, placed over the præcordia. I have tried various narcotics besides these just named; but less certain advantage has been derived from them than from those. The extract or tincture of *aconitum*, or of *stramonium*; or the powdered root or leaves, or the extract of *belladonna* are, however, often of service, especially when the medicines just mentioned have failed.

58. *b.* The *second intention* has been best answered by purgatives, by mild and chiefly farinaceous food, by abstinence from stimulating liquors, by tonics conjoined with absorbents and stimulants, and by external drains or derivatives long persisted in. The *sesqui-oxyde of iron*, in large doses, the bowels being kept freely open, has been sometimes of service. Dr. Elliotson found benefit from it in one instance; but it has failed in other cases; and equal advantage has been derived from a combination of *sulphate of quinine*, *camphor*, and as much purified extract of *aloes* as acted freely on the bowels. In one of the female cases alluded to, the *nitrate of silver*, given with a narcotic extract, was extremely serviceable. In the other, pills, containing as much *croton oil* as procured at least three or four stools daily, were regularly continued for a considerable time, and a *large issue* was kept long dis-

charging. Complete recovery took place in both instances. In one case, change of air, travelling, attention to diet, and *issues* in the side effected a cure, the patient being a physician of great learning and extensive medical knowledge. In another case, the symptoms were aggravated by depressants and abstinence; and recovery took place during a recourse to *tonics* conjoined with *anodynes*; to a generous and light diet, the patient being allowed from four to six glasses of old wine, or even more, daily; and to change of air, and the amusements and distractions of watering-places. In one instance, great benefit appeared to follow the persevering use of *croton oil* as an external derivative; and eruption over the epigastrium having been kept long out by its means. In the case of a medical practitioner from Devonshire, who very recently consulted me, all these, as well as other means, altogether failed. At last, an ointment containing *aconitine* was directed to be rubbed over the sternum; but of the effect of this I am yet ignorant. In another instance, no benefit followed the application of an ointment containing *veratria*.

59. Besides the substances already mentioned, I have tried many others. *Digitalis* has been of no service. Some benefit, however, has followed the internal use of *turpentine* given in drachm doses until it affected the urinary organs; and from the *iodide of potassium*, or *iodide of iron*, conjoined with narcotics: I tried *creasote* in one case without any advantage. I think that the disease may wear itself out, in some instances, without being much relieved by medicine, if attention be paid to diet and regimen, and to the state of the stomach and bowels, and if the energies of life be supported or promoted by suitable means. At present, I am attending a gentleman who has been for many years afflicted with this complaint, the paroxysms of which, however, come on after considerable intervals. He was formerly subject to gout, which I have attempted to excite in the lower extremities without avail. He has consulted many physicians in London and on the Continent, and has even given homœopathy a lengthened trial. On no occasion had he experienced any material relief. I was requested to see him six or seven years ago, and have since continued to prescribe for him occasionally, excepting while he had recourse to means prescribed by Dr. Turnbull, from which he derived no benefit. The attacks are shortened and relieved by the medicines mentioned above (§ 57); but they still recur, although not so frequently as before; attention to diet, an open state of the bowels, and gentle exercise in the open air, being found most efficacious in deferring their visitations.

[Cardialgia will often be promptly relieved by the administration of a gentle emetic, consisting of a few grains of the sulphate of zinc and ipecacuanha, given in a single dose. We have known a patient labouring under this affection, with most distressing palpitations, effectually relieved by this combination, even before vomiting took place. Immersing the feet and hands in hot water, containing salt or mustard, will frequently tend to abate the pain, and cut short the paroxysm. Mental tranquillity is of the first importance in warding off attacks of this disease. Pure air, a regulated diet, and gentle exercise, are also essential to recovery.]

Biblioo. and Refer.—*J. Brown*, Med. Essays on Fever, Inflam. Rheumatism, Dis. of the Heart, &c., 8vo. Lond., 1828, p. 221.—*T. P. Teale*, Treatise on Neuralgic Diseases, &c., 8vo. Lond., 1829, p. 45.—*Elliotson*, Opus citat., p. 33; and in Lancet, 1830-31, vol. i.; see, also, *Johnson's* Med. and Chirurg. Rev., vol. x., p. 93; vol. xii., p. 122; and vol. xiv., p. 330.—*Andral*, Anat. Patholog., t. ii., p. 344.—*A. Turnbull*, Treatise on Painful and Nervous Affections, &c., 3d ed., 8vo. Lond., 1837 (*Employs the narcotic alkaloids internally and externally*).

IV. Inflammations of the Heart and Pericardium.—Syn. *Carditis*, Auct.; *C. Spontanea*, Sauvages; *Cauma Carditis*, Young; *Empresma Carditis*, Good.

Classif.—1. *Class*, Febrile Diseases; 2. *Order*, Inflammations (*Cullen*). 3. *Class*, Diseases of the Sanguineous Function; 2. *Order*, Inflammations (*Good*). III. Class, I. Order (*Author*, in *Preface*).

60. Defin.—*Continued pain or anxiety in the region of the heart, palpitations, a tendency to syncope or faintness, dyspnœa, acceleration and irregularity of the pulse, with symptomatic inflammatory fever.*

61. Inflammations of the heart were first described by Rondelet, and afterward by Salius Diversus and Forestus. More recently, they have received attention from many systematic writers; but, until the appearance of the works of Burns, Corvisart, Kreysig, Testa, Hildenbrand, and Laennec, their pathology and treatment were deficient in precision and accuracy. J. P. Frank first directed attention to inflammation of the *endocardium*, or internal membrane of the heart, especially in connexion with inflammation of the internal surface of the blood-vessels. Hildenbrand considered that inflammation might affect either the *pericardium* reflected over the heart, or the *substance of the organ*, or the *membrane covering the valves and internal surface* of the compartments; but that it was seldom confined to any one of these situations. Of still more recent writers, some have entirely overlooked inflammation of the internal membrane, while others have very properly insisted upon its frequency and importance, in its various grades, and in respect of its diversified results. It is somewhat surprising that Laennec and Hope should have neglected this form of carditis, after attention had been directed to it by Frank, Hildenbrand, Lobstein, and Kreysig. M. Bouillaud has considered it much more fully than any former writer; but he is mistaken in thinking that he is the earliest writer upon it; for, in addition to the names just mentioned, Bertin, Barbier, Littre, P. M. Latham, Elliotson, and Watson, wrote upon it before the appearance of his excellent work. Hildenbrand expressly refers the lesions of the internal surface of the organ, and of the valves, to inflammation; these lesions having a more or less strict reference to the intensity and duration of the inflammatory action. (*Institutiones*, t. iii., p. 263.) Since 1824 I have described *internal carditis* in my lectures, and have pointed out the alterations of structure induced by it; and, in treating of inflammations and organic changes of the heart, I have always described it first, considering it as one of the most frequent forms of carditis, and, in its various grades, as the cause of most of the alterations observed in the structure of the organ. On the present occasion, I shall

consider, *first, internal carditis*, or endocarditis; *secondly, external carditis*, or pericarditis; and, *thirdly, carditis proper*, or muscular carditis, with the lesions which are more immediately induced by them, individually and conjointly. Although it is necessary thus separately to discuss these diseases, inasmuch as each may exist in a primary and distinct form, yet, as this is comparatively rare, I shall also consider their associations with each other, and with other maladies.

i. Inflammation of the Endocardium.—Syn. *Carditis Interna*, Author; *Endocarditis*, Barbier, Littré, Bouillaud; *Inflammatio Superficiei internæ Cordis*, Hildenbrand; *Internal Carditis, Inflam. of the Internal Membrane of the Heart.*

62. Charact.—*Oppression and anxiety at the Præcordia, with frequent faintnesses; dyspnœa; increased action, remarkable acceleration, and irregularity of the heart; and morbid sounds heard on auscultation; the pulse being weak, small, irregular, or indistinct.*

63. *A. History.*—The serous membrane lining the cavities and valves of the heart is occasionally found intensely red in one or both sides of the organ. This change has even extended to the aorta and pulmonary artery. Since it was first noticed by J. P. Frank, it has attracted much attention. The redness cannot be removed by washing, and hardly even by maceration. It has been ascribed to the imbibition of the colouring matter of the blood; but frequently no blood is found in contact with the coloured part. It evidently does not arise from congestion of the cavities of the heart previously to death, because it has been observed where no such occurrence has taken place farther than is always attendant upon dissolution. It certainly is not owing to decomposition, either incipient or advanced, as no signs of this change have been detected in connexion with it. That it is essentially dependant upon inflammation is shown by its being very often attended, 1st, by slight thickening and softening of the membrane itself; 2d, by that change in the connecting cellular tissue which permits this membrane to be more readily detached from the adjoining textures than in health; and 3d, by the presence of the usual products of inflammation affecting serous surfaces. The circumstance of these products being frequently not found on the reddened or injected internal surface of this organ is readily explained by the fact that the lymph, the usual product of inflammation of serous membranes, being effused in a fluid state, is commonly carried away by the current of the circulation before it can coagulate on the inflamed surface. Besides, *internal carditis* very often takes place in connexion with that state of constitutional power which John Hunter very ably proved to be incapable of forming coagulable lymph. But this disease is not unfrequently met with in a form which does not admit of doubt; and to that, more especially, I have now to direct attention; its more disputed states, also, coming under consideration in the sequel.

64. Krevsig (*Ueber die Krankh. des Herzens*, 2d th., p. 125) was the first to give a detailed *description* of *internal carditis*, but M. Bouillaud has very recently entered upon the subject much more fully than any of his predecessors. The frequency of the disease, especially in connexion with articular rheumatism, will enable the practitioner to investigate its nature and the phenomena it occasions in relation to the structural lesions which have been produced. This has been ably done by M. Bouillaud, who, although he is not the first, is certainly the best writer on the subject. Since 1820 my attention has been directed to internal carditis, in consequence of having then met with a remarkable case of it. (See *Lond. Med. Repos.*, vol. xv., p. 26, 1821.) In 1821 I was requested to see another case, which terminated fatally much more rapidly than the former. To both these I was called in consultation with other practitioners; and in both, as well as in a third that occurred the following year, *post-mortem* examinations were made. I have since frequently observed this form of carditis; and my experience warrants the assertion that a large proportion of the more obscure—or what were formerly considered the more obscure—affections of children, particularly those occurring in connexion with affections of the joints, are either internal carditis, or this complaint associated with pericarditis.

65. *a. The alterations of the internal membrane of the heart, caused by inflammation of it*, vary with the intensity and duration of the morbid action. (*a*) *At an early stage*, 1. *Redness* is one of the most common appearances. It varies from a scarlet tint to a reddish brown or violet hue, and may be limited to the valves, or extended to all the cavities, or even to the large vessels. The inflammatory nature of this redness has been disputed; but when it is attended by one or more of the following lesions, its nature then admits of no doubt. 2. *Thickening* of the internal membrane, or endocardium, is a common attendant on inflammatory redness, when it has continued a few days, especially of that part reflected over the valves. 3. *Softening* also sometimes is observed in this stage, but most frequently in the next; this change generally extending to the connecting cellular tissue. 4. *Ulceration* is met with only in rare cases at this period; but instances of its occurrence are recorded by Bouillaud and others. 5. *A puriform* or *albuminous exudation* also takes place; but rarely in such a manner as will admit of its demonstration. So great is the force and rapidity of the current of blood through the compartments of the heart, and so rapid the motions of their parietes, that the products of inflammation of their internal surface are swept away and mixed in the circulating mass. Nevertheless, portions of these secretions are occasionally found after acute endocarditis. Puriform matter has sometimes been seen enclosed in a coagulum, or concealed in the meshes of the muscular columns. Coagulated or albuminous lymph has been found in similar situations; but more frequently adherent to the valves, or to their margins, or tendons. Occasionally it appears like granulations on these parts. 6. *Gangrene* has been supposed hardly ever to occur from carditis; but M. Bouillaud considers that the appearances observed in some of his cases warrant the inference that it may take place, although rarely, in consequence of acute endocarditis; and I believe that it will supervene only when internal carditis attacks a cachectic habit of body,

or when there is a septic tendency induced in the system by a depraved state of the circulating fluids, and by impaired vital power. 7. The *blood* is more or less affected by acute endocarditis. When the disease attacks a person whose blood has not been already materially vitiated, or whose soft solids have not been materially affected, then it occasions a greater or less disposition of this fluid to coagulate, and gives rise to fibrinous concretions resembling those found in the blood-vessels after inflammations of their internal surfaces. These concretions, when formed in the heart, are colourless, elastic, glutinous, and adherent to the internal surfaces of the cavities, or interlaced between the fleshy columns and tendons of the valves, and resemble the buffy coat of the blood. They are manifestly produced by the lymph exuded by the inflamed internal surface of the organ, which, towards the close of life, forms the nucleus around which the fibrinous portions of the blood collect and concrete. If, however, internal carditis occurs when the blood is already vitiated, and vital power is either much impaired or deteriorated, the fluid effused from the inflamed part will be incapable of coagulating itself, or of causing the coagulation of the blood—will be of a watery or sanious kind—and will instantly mix with the mass of blood, and farther vitiate it; death soon taking place, with all the symptoms of adynamic or putro-adynamic fever.

66. *b.* The *second stage*, or the period intervening between the fifteenth and thirtieth day of the disease, is attended by other alterations. 1. The inflamed membrane is more *thickened*, this change often extending to the connecting cellular tissue, and even to the fibrous textures, especially of the valves. 2. The albuminous or fibrous exudations now pass from the amorphous to the organized state, and assume the appearances of *excrescences, vegetations, granulations, cellulo-fibrinous adhesions*, and of *sero-albuminous false membranes*. M. Bouillaud observes that the excrescences or granulations are most frequent on the valves, especially their free edges. He divides them into the *globular* or albuminous, and the *warty*. The former are soft, of a whitish, yellowish, or reddish hue, and easily detached, and originate in the organization of adherent coagulable lymph, as observed to take place on the surface of other serous membranes. The warty excrescences are of a cartilaginous consistency and firmly attached. They are either distinct, or aggregated into groups presenting a cauliflower appearance, and vary in size from that of a millet-seed to that of a pea. Both these kinds of vegetations seldom exist alone, either on the valves or on the internal surface of the cavities; but are commonly attended by fibro-cartilaginous or calcareous induration of the valves; and when they are large, numerous, or aggregated, they necessarily occasion narrowing of the orifices, and an impediment to the action of the valves. 3. *Adhesions* of the opposed surfaces of the internal membrane were first described by M. Bouillaud, who has adduced six cases in which he met with them. They are, however, rarely observed; for the force of the blood's circulation, and the movement of the parietes of the cavities and of the valves, prevent their formation, excepting at those places where these obstacles are the least, as between the less moveable parts of the valves and the opposite surfaces of the ventricles. These adhesions disturb the regularity of the circulation, by preventing the valves from completely closing the orifices. Another species of adhesion is sometimes observed between the opposite margins of the valves in certain cases of narrowing of the orifices, which will be mentioned hereafter. 4. *Organized false membranes* are also occasionally found covering a greater or less extent of the internal surface of the heart; and M. Bouillaud states that he has seen these membranes consist of several superimposed layers. In place of these, small colourless patches, of from four to six lines in diameter, sometimes form on the endocardium, and may be removed, leaving it more opaque than natural. In many cases, the supposed thickening of this tissue has been entirely owing to organized false membranes; but as often the endocardium is itself thickened, opaque, and its free surface unequal, somewhat wrinkled, and villous; this change extending, as stated above, to the connecting cellular tissue.

67. *c.* In the *third* or *chronic stage* of internal carditis, the cellulo-fibrous, the fibrous or fibro-cartilaginous alterations or formations observed in the former stage are converted into the *cartilaginous, osseous*, or *calcareous state*. 1. These latter productions sometimes consist of circumscribed points—occasionally of thin patches of the size of the finger-nail, or even larger—or more rarely of rounded masses. The valves may be almost entirely changed into a cartilaginous or osseous structure; but the fibrous zone of the orifices, and the points of the valves, most frequently undergo this alteration. Between these morbid patches or incrustations, the spaces are either natural or simply thickened. The *osseous formations* often reach a very considerable size, and assume very irregular shapes, and sometimes even penetrate deeply into the substance of the heart. 2. The cartilaginous or osseous valves are variously altered. As long as these changes consist of simple points or laminæ of small extent, the thickened and more rigid valves may still perform their offices; but when these alterations become more extensive and complete, the valves can no longer fulfil their functions. In this stage they present various lesions, as to form. Sometimes, as shown by Laennec, Bertin, and others, their margins, especially those of the aortic valves, are folded *in*, so as to give an *inverted* appearance; and occasionally they are folded back, forming what has been described by Dr. Hodgkin and others under the name of *retroversion*. They may also be too short, or too unyielding, or too small, to close their respective orifices; and the orifices, on the other hand, may be too large for the valves. In either case these latter will be *insufficient* for their purposes. The diseased valves are occasionally perforated, or torn or ruptured in different directions; and those of the aorta have been found so completely torn as to be nearly detached. Sometimes one set of valves only is affected; but more frequently, when one set is very severely altered, another is opaque, thickened, or otherwise changed in some degree. 3. *Contraction* of the heart's orifices is among the most common and most serious

consequences of the changes now being considered. It may be so extreme as not to admit the point of the little finger, or even a quill. The thickened and hardened valves sometimes adhere at their opposite margins, leaving a permanent opening of a roundish, oval, crescent, or slit-like form; which, in the case of the auriculo-ventricular valve, resembles the glottis or the os tincæ, owing to the thickening of the margins, and projection into the cavity of the ventricle. The thickening and induration occasionally extend to the tendons, or even to the muscular columns. The semilunar valves also often stand firm and convex, or rigid. These changes have been well described by Mr. Adams and M. Bouillaud. Dr. Elliotson remarks that the valves of the pulmonary artery sometimes grow up so as to leave only a small round or triangular opening in their middle.

68. *d.* The inflammatory origin of the changes now described has been doubted by several pathologists, and even by Laennec; but it has been advocated by Frank, Kreysig, Hildenbrand, Andral, Elliotson, Bouillaud, Latham, Watson, and others. Osseous formations in the heart have been supposed to occur only in advanced age. Bouillaud states, that of 44 cases, 33 occured in persons under fifty, and 19 out of these were observed in persons under thirty: one being only ten years, another seven, and a third ten months. I have met with this formation in two children, one of seven, the other of ten years; and in both the symptoms and associated lesions observed on dissection were obviously inflammatory. Indeed, the matter is put beyond dispute. The *narrowing* of the orifices of the heart by chronic inflammation is, as remarked by a recent writer, very analogous to what takes place in other organs from this cause—as in the urethra, and lachrymal and biliary ducts, the pylorus, the rectum, &c.; and the hypertrophy of the heart which succeeds, may be compared to the thickening of the muscular coats of the bladder, stomach, and other hollow viscera, arising in such circumstances from the difficulty of expelling their contents, owing to the obstruction. When inflammation attacks the internal surface of the heart, the parts of it about the boundaries of the cavities, and near the orifices, or covering them and the valves, are most liable to be affected, as commonly observed about the boundaries of other cavities and canals. Bichat had noticed the greater frequency of the lesions just mentioned in the left than in the right side of the heart. The fact is undoubted. M. Bertin considered that inflammation and its consequences are more likely to be occasioned and maintained by the exciting properties of arterial blood, than by the inert venous blood returned to the right side of the heart. This, however, is not sufficient to explain the circumstance; for inflammations are more frequent in veins than in arteries.

69. *B. Symptoms of Internal Carditis.—a.* In the *first or acute stage*, actual *pain* is seldom felt, unless the disease be associated with pericarditis or with pleuritis; but uneasiness, oppression, or anxiety in the præcordia, with faintness, is always complained of. The *physical signs* require the closest attention. 1. The præcordia region, in simple endocarditis, is shaken by the violence of the heart's action, the hand being forcibly resisted by the impulse when applied over this region. The pulsations are felt over a greater extent than natural, owing to the turgescence of the organ in an inflamed state; and a vibratory tremour, more or less marked, is also sometimes felt. 2. *Percussion* furnishes a dull sound over a greater extent of surface than natural, from four to nine or twelve square inches. But, in order to distinguish this sound from that attending effusion into the pericardium, it is necessary to observe that it coexists with a superficial, visible, and sensible pulsation of the heart; the beat being profound, and hardly visible or sensible in cases of pericarditis with effusion. 3. *Auscultation* detects a bellows sound, which masks the two normal sounds, or one of them only. This sound is the louder, the stronger the action of the heart; and is also rougher, the greater the swelling of the valves, and the more abundant or concrete the exudation of lymph from the inflamed surface. Sometimes when the palpitations are violent, a metallic sound isochronous with the systole of the ventricle is also heard. 4. The *force* of the heart's contractions is changed both to the eye and to the touch, and the frequency equally affected, the pulse rising sometimes as high as 140 and 160, or even higher, in a minute, and becoming irregular, unequal, or intermittent. 5. *Animal heat* is generally also increased, but not usually in proportion to the augmentation of the circulation. The arterial pulsations represent only the *frequency*, but not the *strength* of the heart's action in this disease; for, while the contractions of the heart are energetic, the *pulse* is generally small, soft, and indistinct. This is owing to the obstacle opposed to the circulation by the swelling of the valves or orifices, or both; or by the fibrinous exudations formed around them; a smaller column of blood being thrown into the arterial trunks; hence, probably, arise the pallor, anxiety, jactitation, faintness, leipothymia, want of consciousness, &c., frequently also observed.

70. In general, the venous circulation is not materially disturbed in this stage of internal carditis; but when the above obstacles to the circulation through the orifices become considerable, dyspnœa, a bloated or livid appearance of the face, slight œdema of the extremities, and pulmonary, or even cerebral congestion often supervene. In this case, the patient experiences the most distressing oppression, cannot lie down in bed, is watchful, restless, and subject to a constant jactitation. In the simple form of endocarditis, delirium seldom occurs; but temporary wandering of the mind, and sudden terror or unconsciousness, are occasionally present when the dyspnœa is extreme. The digestive functions, the secretions and excretions, are also more or less impaired; and in the more extreme states, cold sweats often break out.

71. The above symptoms appertain especially to the *acute form* of endocarditis, particularly when it is general. But when it is *partial*, or *sub-acute*, or *chronic*, the symptoms are not so prominently grouped; and it is, consequently, recognised with greater difficulty. An attentive observer, however, will seldom mistake it for any other disease, excepting pericarditis, with which it is very liable to be confounded,

even by the most experienced. But the error is not material; for both diseases very often coexist, and the means of cure are the same in each. When pericarditis is attended by effusion, then it is readily distinguished from endocarditis by the circumstance mentioned above (§ 69); but when it gives rise merely to a pseudo-membranous exudation, a diagnosis is formed between them with very great difficulty; the sounds, however, in this state of pericarditis will be a tolerable guide to a correct inference.

72. *b.* The *symptoms of the second and third, or chronic stages of internal carditis* have reference chiefly to the *structural changes* that have been induced. The disease may have terminated in resolution before advancing into these changes, the foregoing symptoms having disappeared. But when it has been mistaken, or neglected, or imperfectly treated, it passes into these sub-acute and chronic states or stages; the inflammatory action gradually subsiding as to intensity, or passing into that slow or chronic form observed to produce similar changes in serous tissues to those which have been described (§ 66, 67). Of all the organic lesions consequent upon endocarditis, the different forms of *induration of the valves and contraction of the heart's orifices* are the most permanent; often continuing after the inflammatory action which produced them has disappeared, whether this action has been *acute, sub-acute,* or *chronic.*

73. *c.* The *symptoms* of induration of the valves and narrowing of the orifices are generally such as lead to the detection of these changes, as well as of the consecutive hypertrophy and dilatation. 1. *Inspection* shows merely the extent, force, and rhythm of the pulsations. 2. The *hand applied on the præcordial region* discovers a vibratory or purring tremour, with irregularity, inequality, or intermissions of the heart's action, or a treble or quadruple movement, as well as the increased force and extent of the contractions. 3. *Percussion* furnishes a dull sound to a greater extent than in health. 4. *Auscultation* detects, during the contractions of the heart, a morbid sound, which is *blowing, filing, grating, rasping,* or *sawing,* as to its character, according to the resistance furnished by the diseased valves, to the degree of contraction of the orifices, to the capacity of the cavities, and to the strength of their parietes. Each of these sounds may be either *double* or *single:* the former completely masking or replacing both the natural sounds; the latter, only one of them. The morbid sound varies in duration and intensity: it is sometimes sudden, short, abrupt, and jerk-like; in others it is slow, prolonged, or drawn out. It is occasionally so loud as to be heard even at a short distance from the chest; and, in some cases, it is so slight as to be detected with difficulty. In a few instances of induration of the valves, the bellows sound assumes a sibilous character. 5. *Pain* seldom attends the above lesion; but the patient complains of weight, or of uneasiness or embarrassment at the præcordia; of palpitations, of sinking, or of faintness. The palpitations are excited by the least exertion or mental emotion, and are characterized by the increased force, and the remarkable frequency of the pulsations, which may reach 160 beats or upward in the minute.

74. When, therefore, either of the morbid sounds just mentioned is present at the præcordial region, with a vibratory or purring tremour, palpitations, an irregular, tumultuous, or intermittent action of the heart, it is in the highest degree probable that induration of the valves, and narrowing of one or more of the orifices, exist, particularly if the disease is of some months' or years' duration. This inference amounts to certainty, when, with the above *local* signs, the following *general* or sympathetic phenomena are present, especially a small, weak, or vibratory pulse, which contrasts remarkably with the energetic actions of the heart; dilatation of the superficial veins, particularly of those near the heart, as the jugulars, &c.; sallowness or lividity of the countenance; symptoms of congestion of the lungs, brain, liver, and mucous surfaces; passive hæmorrhages from the lungs and mucous membranes; dyspnœa, shortness of breath, or sense of oppression or stuffing in the chest, increased on slight exertion; effusions of fluid into serous cavities, or into cellular parts, &c.; and cerebral derangement, as restlessness, watchfulness, frightful dreams, jactitation, laborious breathing, &c. Pulsations of the jugular veins, synchronous with the pulse, are observed when a reflux of a portion of the blood takes place from the right auricle during the contraction of the right ventricle, owing to insufficiency of the tricuspid valve, either from alterations in itself, or from dilatation of the auriculo-ventricular orifice.

75. *d. The diagnostic symptoms of lesions of the different valves, and of narrowing of the different orifices of the heart,* have been stated with more confidence than truth by some who have made the stethoscope an instrument of parade and charlatanry. In answer to the question, Can this diagnosis be established? M. Bouillaud justly answers that it is more curious than useful. There is no doubt of the morbid sound being loudest at a point the nearest to the diseased orifice; and upon this much of the diagnostic evidence rests. But farther proof is requisite. When the *pulse* is examined in connexion with the action of the heart, it is generally more irregular, unequal, intermittent, and smaller, in narrowing of the *aortic orifice,* than in that of the *left auriculo-ventricular orifice;* and the vibratory tremour of the pulse in the large arteries, first noticed by Corvisart, is most remarkable in the former case. The maximum also of the intensity of the purring tremour in the præcordial region, as well as the maximum intensity of the morbid sound, corresponds with the contracted orifice. M. Bouillaud considers that synchronism of the morbid sound with the ventricular systole or diastole signifies nothing; but in this he is incorrect, his opinion being the consequence of his views respecting the source of the natural sounds of the heart. Narrowing of the *orifices of the right side* is infinitely less frequent than that of the left orifices; and is indicated by the correspondence of the maximum of the morbid situation and of the purring tremour with the situation of these orifices, and by the distention and pulsation of the large veins, especially of the jugulars.

76. Dr. Williams (see *Medical Gazette,* vol. xxvi., p. 601) has divided structural lesions of

the valves and orifices of the heart into two kinds, the *obstructive* and *regurgitant*; according as they *impede* the current of blood in its proper direction, or permit its *reflux*. But some alterations are both obstructive and regurgitant, as they impair both the opening and the closing of the valves.—*a. Obstruction at the aortic orifice* is attended by a bellows sound, which is superficial, and occasionally sibilous, about the middle or top of the sternum, or about the cartilages of the fifth and sixth left ribs, and which masks or replaces the *first* natural sound, and occasionally extends to the carotids. The *second* natural sound is either weak or indistinct, when the aortic valves are much diseased, the pulse being remarkably small and weak. Obstruction of this orifice generally causes enlargement of the heart. When lesions of the aortic valves render them *insufficient*, and occasion a *reflux* current into the ventricle, a short whiffing sound replaces the *second* natural sound at the middle of the sternum, the second natural sound in the pulmonary valves still remaining audible to the right of the sternum. Insufficiency of the aortic valves gives rise to dilatation, with hypertrophy of the left ventricle.

77. *b. Obstruction at the left auriculo-ventricular orifice*, or obstructive disease of the *mitral valve*, may be attended by a morbid sound or murmur at the time of the second natural sound, owing to the resistance to the current during the refilling of the ventricle; the morbid sound, however, not replacing the second normal sound, as the action of the semilunar valves may still be perfect, but merely attending it, or masking it, when loud. This lesion is accompanied by a small, but strong or hard pulse. It usually occasions hypertrophy of the left ventricle, sometimes with diminution of its cavity, and dilatation of the left auricle. *Insufficiency* of the mitral valves produces a morbid sound at the time of the first natural sound, that is most distinct at the left margin of the sternum, between the third or fourth ribs, or rather more to the left, or as far as the left nipple, or a little below it; and that does not extend to the arteries. The pulse is always irregular or intermittent. This lesion commonly gives rise to hypertrophy of the left ventricle, with dilatation of the auricle.

78. *c. Lesions of the semilunar pulmonary valves* are very rarely observed. Obstruction in this situation occasions a morbid sound at the middle of the sternum, more superficial and whizzing than that caused by disease of the aortic valves (Hope). The circumstances of the morbid sound being inaudible over the great arteries, as Dr. Williams observes, of its not affecting the pulse, and of its causing more marked signs of venous congestion and disease of the right side of the heart, are more to be depended upon than the mere situation of the morbid sound in the diagnosis of this alteration.

79. *d. Lesions of the tricuspid valve, and of the right auriculo-ventricular orifice*, are more common than those of the pulmonary valves, but less so than those of the mitral valve. They give rise to a deep blowing or filing sound, most distinct under the sternum at the juncture of the fourth rib. If the lesion *obstruct* the current of blood, the morbid sound will replace the *second* natural sound; but if it allow *regurgitation* into the auricle, the morbid sound will accompany the *first* sound; the regurgitation giving rise to pulsation in the jugular veins, and to dilatation of the right auricle or ventricle, or of both.

80. *e. Adhesion of the auriculo-ventricular valves to the parietes of the heart*, according to M. Bouillaud, are attended by the symptoms of narrowing or contraction of the orifices, especially palpitations, the bellows sound, the purring tremour, dyspnœa, and venous congestions, with passive effusions; but are distinguished, 1st, by the more broad, less dry, and less rasping sound than in narrowing; 2d, by the less irregular, less unequal, and less intermittent pulsations of the heart; the purring tremour being more diffused, and less distinct than in narrowing of the orifices; 3d, by the pulse being less small, and the oppression at the præcordia, the venous congestions, and their consequences, being less remarkable than in the latter lesion.

81. *f. The diagnosis of thickening of the internal membrane of the heart*, whether this change depends upon a true hypertrophy of this tissue, or upon the organization of a false membrane lining its surface, is frequently impossible. When the thickening extends to the valves, without any other lesion of them or of the orifices, a remarkable increase in the loudness of the sounds is produced, especially if the mitral valve is affected. When the valves, or the orifices, or the parietes of the compartments are otherwise altered, as they most frequently are contemporaneously with this change, the signs will have a particular reference to such alterations.

82. It is justly remarked by Dr. Williams, that when two or more of the preceding lesions are associated, the signs become complicated, and the obscurity of the case increased; for, unless the character and locality of the morbid sound be distinct, the more prominent may mask the others. When the sounds are different, one being filing or grating, and the other blowing, the difficulty is less, and the nature and position of each affection may be exactly indicated. Rasping or sawing sounds are very rarely produced by mere contractions or by soft depositions, unless for a short time during increased action of the heart. When these sounds are permanent, they may be referred to cartilaginous or osseous deposites in or about some of the valves. Hypertrophy and dilatation often make the signs of diseased valves more evident, by augmenting the force of the current through the cavities, and rendering more distinct the place and order of the sounds.

[*Endocarditis*, though frequently a primitive affection, is perhaps no less often associated with acute articular rheumatism than pericarditis; and, according to some pathologists, it is a far more frequent complication. It also occurs as a sequel of pneumonia, pleurisy, and inflammation of the serous tissues. Its presence may generally be presumed if a patient be suddenly attacked with three signs: 1st. Fever. 2d. Violent action of the heart. 3d. A valvular murmur which did not previously exist, provided the murmur be well distinguished from an attrition murmur, as the latter indicates pericarditis. The evidence is still strong.

er if the signs occur in connexion with acute rheumatism. Most cases of the disease terminate in recovery, although it often lays the foundation of organic changes of the valves, which may ultimately produce the most serious consequences.]

ii. Inflammation of the Pericardium.—Syn. *Carditis externa*, Author; *Pericarditis*, Auct. var.; *Exocarditis*, Barbier; *Carditis*, Sauvages, Vogel, &c.; *Inflammatio Cordis et Pericardii*, Senac; *Hertzbeutelenzüngdung*, Germ.; *Péricardite*, Fr.; *Inflammazion del Pericardio*, Ital.; *External Carditis*; *Inflammation of the Envelope of the Heart.*

83. Charact.—*Pain under the sternum, inclining to the left side and to the epigastrium, with tenderness on firm pressure in the latter situations; dyspnœa; anxiety, oppression, constriction, or tightness at the præcordia; great rapidity and irregularity of the heart's action, and of the pulse; inflammatory fever; and morbid sounds detected by percussion and auscultation.*

84. *A. History, &c.—Pericarditis* was first mentioned by Avenzoar, who was himself attacked by it, and was cured by blood-letting; but, excepting the cursory notice taken of it by Rondelet, Salius Diversus, and Forestus, little attention was directed to it until Bonet, Hildanus, Bergre, Morgagni, and others recorded cases illustrative of its morbid relations. Still more recently, our knowledge of its nature and treatment has been much advanced by the writings of Corvisart, Burns, Keeysig, Laennec, Testa, Bertin, Elliotson, Stokes, and others; and by numerous memoirs which have appeared in the transactions of medical societies and in periodical works, and to many of which references are subjoined.

85. *B. Structural Lesions.—a. In the acute stage of pericarditis.—a.* The earliest change is *redness* of the pericardium, from capillary injection. In some cases, particularly when death has taken place rapidly, the redness is not remarkable, probably owing to the recession of the blood from the capillaries after death. The increased vascularity is principally seated in the subjacent or connecting cellular tissue; and the redness is sometimes increased by the infiltration of minute quantities of blood into this tissue, or into the serous membrane itself, so as to give rise to ecchymoses, or red points, spots or patches, or streaks. The thickness, transparency, and consistence of the pericardium seldom undergo great changes at an early period of the disease, yet this membrane is often thicker and more opaque than in the healthy state. It is generally detached with greater ease from the surface of the heart, and its removal shows the injection and redness, or infiltration of the connecting cellular tissue. The natural exhalation from the surface of the pericardium is either increased in quantity or remarkably altered in kind, or both; the *accumulated effusion* which thus results constituting a principal part of the changes produced by the disease.

86. *β.* The *effusion* into the pericardium presents various states, and undergoes changes of much importance as respects the subsequent course of the disease: 1st. The effused fluid usually coagulates or separates into a turbid or flocculent serum and a concrete or fibrinous false membrane, which is organizable, and commonly covers the free surface of the cardiac envelope. In some instances the coagulation is more irregular, or presents a curdled appearance, without being disposed in a membranous form over the external surface of the organ. The more fluid part of the effusion is generally serous, but it is sometimes sanguineous or tinged by the escape of a portion of the colouring substance of the blood. Occasionally the effused matter consists chiefly of coagulable lymph disposed in the form of false membrane; but more frequently the membranous depositions are accompanied by a quantity of fluid varying from a few ounces to several pounds. M. Louis adduces a case in which it amounted to four pounds; and Corvisart another, in which the pericardium contained a still larger quantity of a sero-puriform fluid. 2d. In some cases of pericarditis, the effused matter consists of a homogeneous, inodorous, and *well-digested pus* of the consistence of cream, and of a grayish, yellowish, or greenish-white hue. The quantity of this matter varies as much as that of the former, or sero-pseudo-membraneous effusion. Cases of pericarditis, giving rise to a purulent effusion, have been recorded by P. Frank, Hasenoehrl, Monro, Stoerck, Stoll, Lieutaud, Senac, Baillie, Corvisart, Louis, Bouillaud, and several recent writers. Instances in which the present fluid presents a *sero-puriform* character are frequent.

87. *γ.* The *coagulated* or *fibrinous lymph* formed in acute pericarditis is sometimes found in amorphous masses; but it is most frequently disposed in a membranous form, covering the greater part, or even the whole, of the free surface of the pericardium, especially of that part reflected over the heart. This false membrane varies in thickness from a fraction of a line to several lines. The appearance of the free surface of this membranous exudation is generally peculiar. Corvisart compared it to the internal surface of the second stomach of a calf. Sometimes it resembles the surface of a pineapple. Dr. Hope remarks that, when the layer is thin, its free surface is often pitted with small depressions at regular intervals, presenting the aspect of a fine reticulation; and that, when it is thick, the surface is divided into more spacious cells, often as large as a pea, and separated by coarser partitions. In most of the cases which I have examined the surface either was shaggy, or hanging in numerous short shreds—the "*Cor hirsutum, villosum, tomentosum*" of the older writers; or presented an appearance similar to that produced by pressing soft grease between two smooth plates and by forcibly separating them. In some preparations of my late colleague Dr. Sweatman, these appearances are beautifully preserved, the membranous exudation in these having surrounded the whole of the heart. M. Cruveilhier and Dr. Hope have delineated these changes in their pathological works. In some instances the effused lymph is arranged in transverse undulations, or it presents an indented or wrinkled form. It occasionally acquires a deeper hue the older it becomes, or presents a deep brown or reddish-brown colour, most probably derived from the colouring matter of the blood which the effused fluid con-

tained. The more recent the membranous exudation, the more feeble is its *cohesion*; and the older it becomes, the greater is its tenacity and elasticity.

88. *δ.* The rapidity with which effusion takes place in consequence of pericarditis is often remarkable; and the celerity with which organization commences in the coagulated lymph is often equally great. This is most evident when the lymph agglutinates the opposing surfaces of the membrane. Many years ago I demonstrated that, when coagulable lymph is effused on an inflamed serous surface, and is brought in contact with that portion of the surface directly opposite to it, inflammatory action is generally thereby excited in the latter situation without having extended to it continuously from its former seat. In all such cases the lymph acts as an irritant to the healthy surface opposite, and sooner or later induces inflammatory action and adhesions of the opposite parts. This always takes place when the pericardium is acutely inflamed, and when the quantity of the fluid effused is not too great to prevent adhesion from taking place.

89. *ε. In the chronic stage or state of pericarditis*, the pericardium becomes thickened or hypertrophied; but this change is most remarkable in the subjacent cellular tissue. The apparent thickening is also sometimes owing to a fine and dense false membrane, so firmly adherent to the pericardium as to resemble it on a superficial view. In this state or stage of the disease, the capillary vessels and larger branches are developed beyond their natural size. Sometimes, in addition to these changes, a quantity of puriform or sero-puriform matter is found in the pericardium; but more frequently a quantity of serum, either limpid, turbid, opaque, flocculent, or sanguineous, is met with.—*α.* The *coagulable lymph* effused in the acute state of the disease generally undergoes various changes in the course of this stage. In its place there is sometimes only found cellular adhesions, general or partial, or merely simple bands stretching between the opposite surfaces. In other cases, organized false membranes cover a portion, or even the whole of the surface, and present a whitish, milky, or opaline appearance, particularly when they are limited in extent. In all these cases, more or less fluid, such as just described, is also present. Partial or limited false membranes are seen not only on the surface of the heart, but frequently also on the parts of the large vessels covered by the pericardium, and especially over the root of the aorta. These membranes are usually cellulo-fibrous or fibrous; but, in the more chronic cases, they may assume the cartilaginous, or even the osseous state. In a few instances the heart has appeared as if more or less enveloped in an osseous shell. Sometimes these changes take place in the fibrous structure of the pericardium itself. Occasionally, in place of the morbid productions being disposed in the form of bands or membranes, they assume that of granulations or excrescences.

90. *β.* The effused fluid and morbid productions in the pericardium are often attended by various changes in the *substance*, or in the *internal surface* and compartments of the heart, generally resulting from the extension, the pre-existence, or the coexistence of inflammatory action in these parts, especially in the endocardium. M. Bouillaud attributes much of the alteration presented by the substance of the organ in these cases to the compression which the matters in the pericardium exert, and to the consequent embarrassment of the heart's action. This is probably the case; but much is also owing to the consequences of associated inflammation of the internal surface of the organ; for, although this disease may commence in either surface, it seldom runs its course in a simple form, or without extending to the other, or even to other structures. However this may be, it is indisputable that in a very large proportion of cases of pericarditis, and especially in those which are chronic, more or less of the changes characterizing, or resulting from *internal carditis* (§ 66, 67) are also observed, as well as many of those alterations which are yet to be considered. M. Bouillaud has noticed *atrophy* of the heart as one of the changes consequent upon membranous productions and effusions in the pericardium. This change I have also remarked, as well as loss of the colour: an extreme paleness of the heart's substance. This latter change was observed in a case published by me in 1821. But *hypertrophy*, &c., of one or more of the compartments of the organ is most frequently seen in connexion with pericarditis. In some instances, *induration* and thickening of the pericardiac envelope extends from the subjacent cellular tissue to the muscular structure, or rather, perhaps, to the cellular tissue connecting the fibres; and these parts assume, in rare cases, a nearly cartilaginous state. *Softening*, attended by a dark or deep red colour (*brownish-red softening*), or by loss of colour (*yellowish-white softening*) of the substance of the heart, also, is occasionally met with in pericarditis: the former most frequently in the acute state, the latter in the chronic. But these and still more remarkable changes are observed chiefly in cases of pericarditis associated with acute carditis (§ 109). The coincidence of yellowish-white softening of the substance of the organ with pericarditis was noticed by Laennec, and has been attributed by Bouillaud to the macerating effect of the serum contained in the pericardium. In a case of rheumatic pericarditis, readily recognised during life, this form of softening was observed by me on dissection; but there was scarcely any effusion, and there had been no evidence of much having existed at any period of the disease, although partial false membranes had formed. In thirty-six cases in which M. Louis observed effusion in this disease, the fluid was sero-sanguineous in four, a turbid serum in nine, sero-puriform in fifteen, and purulent in seven. According to my own observation, a turbid or flocculent serum is most frequently met with, a purulent matter being found chiefly in sub-acute and chronic cases, and independently of any ulceration. (See farther, as to *Effusion of Fluid into the Pericardium*, the article Dropsy of the Cavities of the Chest, § 148, *et seq.*)

91. *γ.* The *external surface* of the pericardium is not always free from very decided marks of inflammatory action. These marks are, however, found chiefly when pericarditis

has been preceded, attended, or followed by pleuritis, pleuro-pneumonia, or by inflammation of the superior surface of the diaphragm, or of the mediastinum. In cases of this kind, and perhaps also in others of great severity, or where the unattached sac has been principally affected, coagulated lymph is not unfrequently found uniting the external surface of the pericardium to the pleura, a turbid serum being more or less abundantly affused into the pleural cavity. While writing this article, I had an opportunity of examining, after death, a remarkable case of this kind; and another, presenting the same appearances, was brought into the dissecting-room of the Middlesex Hospital Medical School while this sheet was about to go to press, the man having died suddenly.

92. *δ.* When pericarditis does not *terminate* in resolution, and in the absorption of whatever lymph has been effused, the next best termination that remains, as Dr. Hope observes, is adhesion of the opposite surfaces; for, should this not take place, the false membrane becomes a secreting surface, effusing more and more fluid until the cavity is completely distended and the action of the heart at last abolished. But, should adhesion take place, farther effusion is thereby prevented, and life is often prolonged for many months, or even years; although adhesion occasions another form of organic change, which ultimately destroys the patient. That adhesion occurs in one case, and not in another, is entirely owing to the quality of the lymph, which depends upon the state of inflammatory action, and that, in its turn, upon the constitutional powers; for the disposition to adhesion will be great in proportion to the abundance of coagulable lymph and scantiness of serous fluid effused, a large quantity of watery, serous, or puriform fluid preventing adhesion from taking place.

93. The *process* of adhesion is very manifest. When the more watery parts are absorbed, either the lymph on the opposite surfaces of the pericardium comes in contact, as when the whole surface is inflamed, or that on the one surface comes in contact with the opposite part, excites inflammatory action in it (§ 88), and a reciprocative effusion of lymph; both portions blending, thickening, or coagulating, and gradually becoming organized. As organization commences and proceeds, blood-stains, straggling red lines, or pink-coloured vascularity appear in the coagulated lymph, which now assumes more and more of a cellular or cellulo-fibrous character, and agglutinates more or less firmly and extensively the opposite parts. The more recent adhesions are generally thick, friable, and separable by tearing into two layers, one adhering to each surface of the pericardium; but those which are of longer standing are thinner and firmer, and consist of fine layers of dense cellular tissue. In some very old cases, this medium of adhesion becomes so thin as to be hardly perceptible, and the union so firm and intimate as not to admit of separation, thereby giving rise to the deception of the pericardium having been wanting.

94. It not infrequently happens that, after the acute symptoms have been partially subdued, and the disease has continued for some months in a chronic state, false membranes, or adhesions, having been formed, the inflammation either recurs, or assumes a more acute state, and gives rise to an additional deposition of lymph, thereby thickening the adventitious membrane very remarkably. In these cases, the layers are successively redder as they are nearer the heart, and exhibit different degrees of consistence, one layer or part being almost fluid or purulent, while another is cellular-fibrous, or semi-cartilaginous, or presents the density of tubercular induration. In these, changes in the substance of the heart, or in its internal surface, orifices, or valves, or in both orders of parts, similar to those already alluded to (§ 66, 67), are generally also observed; and a fatal termination is seldom long deferred.

95. *C. Symptoms and Diagnosis of Pericarditis, and of its Consequences.*—Inflammation of the pericardium was considered by Laennec and several recent writers as the most difficult of the diseases of the heart to detect. This arose from too little attention having been paid to the rational symptoms attending it, and from the sounds occasioned by it having been imperfectly ascertained. The difficulty has been much exaggerated; for, of the numerous cases in which I have been consulted since 1818, some of which were published as early as 1821, the disease was detected during life in all but one, which I saw with Dr. Duffin. This case was complicated with other lesions, and terminated fatally a few hours afterward, the constant vomiting and affection of the diaphragm having masked the symptoms indicative of pericarditis. That this disease is often overlooked, or confounded with inflammations of the pleura, lungs, diaphragm, &c., with which it is often complicated, cannot be doubted; and that it is, in its various grades of intensity and states of association, a much more common malady than has been supposed, is shown by the fact of M. Louis having found it in the proportion of one case in twenty in all the dissections he has made. This is still farther proved by the circumstance of my having seen as many as four cases of the disease in one day, three of them in children under ten years of age, who were brought to my house, and who were examined, also, by Mr. H. Barker, the present house-surgeon to the North London Hospital, and then one of my pupils. On two occasions, I have met with the disease in two children of the same parents, and once in two brothers at the same time. Although auscultation and percussion furnish some of the most important signs of pericarditis, and of its consequences, yet they must not be depended upon without carefully ascertaining the rational symptoms, local and general, and cautiously comparing and estimating all the phenomena observed.

96. *a. Symptoms of the acute or first stage.*—(*a*) The *local signs* of acute pericarditis consist, 1st, of altered *sensibility*; 2d, of disordered *action*; 3d, of change in *form*; 4th, of morbid *sounds* heard on percussion and auscultation.—*a. Pain*, more or less acute, is very frequently complained of under the left nipple, extending to the lower extremity of the sternum, occupying sometimes the whole præcordia, irradiating thence to the left axilla, or arm, or to the diaphragm and epigastrium, or to the left hypochondrium. The pain is pungent, lancina-

ting, tearing, or violent; is often attended by a sense of compression and constriction, and by anxiety; and is increased on percussion, on a full respiration, on coughing, on holding the chest erect, and on lying on the left side. In many cases, however, the pain is dull, or so slight as to be little or not at all complained of; but if pressure be made upon the intercostal spaces, or upward from the epigastrium towards the pericardium, more or less internal pain will be excited. Cases, also, occasionally occur in which no pain is felt at the præcordia, and, consequently, where the existence of pain on pressure in these situations has been neither inquired after nor ascertained; and instances are not uncommon where the pain of pericarditis is masked by an associated acute pleuritis or severe articular rheumatism. I agree with Dr. Elliotson and Mr. Mayne in considering pain or tenderness circumscribed in extent, and confined chiefly to the left side of the epigastrium, and felt most when pressure is directed upward on the diaphragm and under the anterior margins of the left false ribs, as one of the most constant symptoms of pericarditis. M. Bouillaud observes that the more simple the disease, the more frequently is it latent, and in this he agrees with Laennec; that the same holds, also, in respect of rheumatismal pericarditis, which is often attended by little pain, when the adjoining pleura is unaffected; and that the pain is most severe when the costal pleura in the vicinity, and especially when the diaphragmatic pleura is implicated.

97. *β.* The *pulsations of the heart* are stronger and more frequent than natural; sometimes regular, at other times irregular, tumultuous, unequal, or intermittent, with exacerbations of the palpitations. The impulse is then readily felt by the hand, and perceived on inspection. But frequently it can be detected by neither, when copious effusion has taken place into the pericardium, and the palpitations present at the commencement then disappear. In these cases, the actions of the heart are either really or apparently feebler than natural. M. Bouillaud states that when the inflammation is passing into the formative action—when organization is commencing in the effused lymph—the second movement of the heart seems double, or imparts a crepitating or crackling sensation to the hand.

98. *γ.* A more or less evident *prominence* of the præcordia, or of the cartilages of the left ribs, mentioned by M. Louis, is often observed, especially when the disease affects children. It depends either upon effusion into the pericardium and vascular swelling of the affected tissues, or upon inordinate action and consecutive hypertrophy. The concomitant signs, especially the states of pulsation and impulse, will readily disclose the cause of this appearance.

99. *δ. Percussion* furnishes a dull sound to an extent in proportion to the effusion, and at a period of the disease varying with the commencement and progress of this lesion. At first, or in that form of pericarditis called *dry*, but little effusion, or merely a thin membranous exudation of lymph takes place, and the dulness on percussion is not much increased. Hence it is only when effusion is considerable that this means of investigation is of much assistance in this disease. When the fluid is not abundant, the position of the patient will also modify the extent or situation of the dull sound, or even prevent it from being remarked, owing to the gravitation of the liquid to the more depending part of the pericardium.

100. *ε. Auscultation* affords no sign that can be alone depended upon in the acute stage of pericarditis. The sound resembling the *creaking of new leather* is rarely heard in this period, but more frequently in the next. It was first noticed by M. Collin, and afterward mentioned by me in the article Auscultation (§ 41), where I attempted to explain its occurrence. Dr. W. Stokes next treated of it in an able paper on this disease. I have already alluded to cases in which I have met with it, and one in which it was distinctly heard by the patient herself (§ 15). In its true form, it rarely, or only temporarily occurs. But a *friction sound*, which has been noticed by Stokes, Mayne, Watson, myself, and others, is frequently heard in this stage, or when little or no effusion exists, and closely resembles the friction, rubbing, or to-and-fro sound in pleuritis. In some cases, the rubbing sound resembles the rasping, grating, or sawing sound in induration of the valves, from which it must be distinguished, as well as from the bellows or blowing sound, which is also often heard in pericarditis. When the rubbing sound assumes a grating or rasping character, and is thus liable to be mistaken for similar sounds caused by valvular disease, it will generally be found to arise from the rough surfaces of false membranes covering the surface of the pericardium.* In these cases, also, M. Bouillaud likens the friction sound to the rubbing together of taffeta or of parchment. This kind of rubbing sound is to be distinguished from the rasping or sawing sound caused by disease of the valves, by its being double, and more superficial and diffused than it. The *bellows sound*, also, may be confounded with the more superficial and diffused rubbing or crushing sound; but a slight attention will detect the difference between them, arising from the circumstances just stated. This sound, in its different modifications of a filing, sawing, or rasping sound, is always *single*—is a rush, or whiz, as Dr. Watson remarks, and is synchronous with the systole of the ventricles, and deep-seated; the *rubbing* or *friction* sound, in its different states, is a *double* sound, and sug-

* [The practitioner will do well to bear in mind the following conclusions of Dr. Hope, in studying the diagnosis of cardiac affections: 1. The ventricular *systolic* currents, through contracted orifices, from being stronger than the *diastolic*, produce louder murmurs. 2. Considerable contractions of a rough, salient configuration, whether osseous or not, produce the rough murmurs of sawing, filing, or rasping, provided the current be that of the ventricular systole, its diastolic currents being too feeble. 3. The pitch, or key, of murmurs is higher in proportion as they are generated nearer the surface, and the currents producing them are stronger, and *vice versa*. Also, the key is lowered by distance, independent of depth, from reverberation through the chest. 4. Musical murmurs indicate nothing more than ordinary murmurs. 5. Rough murmurs, and even loud and *permanent* bellows murmurs, indicate organic disease. 6. Permanent murmurs from regurgitation necessarily indicate organic lesions. 7. Continuous murmurs in the heart will probably be found to indicate, sometimes organic disease attended with regurgitation out of the aorta into the right ventricle or pulmonary artery, sometimes churning of a little serum between layers of rough lymph on the pericardium, and sometimes, probably, dilatation of the pulmonary artery and compression of the vena innominata.—(*Loc. cit.*)]

gests the idea of the rubbing together of the opposite surfaces of the pericardium, roughened by the exudation of lymph; it ceases when a copious effusion of serum takes place, or when the surfaces become adherent. Both these sounds are sometimes coexistent, especially when the internal and external membranes of the heart are inflamed at the same time; and they may be then severally ascertained by an experienced and careful observer.* I have detected a bellows sound in the larger proportion of cases of pericarditis that I have seen in children. The *rubbing* or *friction* (Stokes, Mayne, Bouillaud), the *to-and-fro* (Watson), the *crushing* (Bouillaud), and the *ascending* and *descending* (Laennec and Reynaud) *sounds*, are either the same, or slight modifications of the same phenomenon;† are heard chiefly in acute pericarditis; are double sounds, although louder during the systole than during the diastole of the ventricles; are caused by changes affecting the pericardium; are not heard in all cases, and only in certain stages or states of the disease, and depend upon different lesions from those which occasion the bellows, rasping, or sawing sounds. These latter proceed from alterations *within* the heart, the former from changes *external* to it. The *creaking* or leather sound, according to my observation, occurs chiefly in the chronic stage of the disease; is a different sound from that of rubbing or friction; does not depend upon that cause, but upon thickening and induration of the pericardium reflecting over the heart and of the connecting cellular tissue, or upon the existence of a dense or an elastic false membrane, as stated above (§ 15).

101. When copious effusion has taken place into the pericardium, the natural sounds of the heart, as well as the morbid sounds arising from changes about the valves or in the orifices of the organ, will be heard more obscurely, or at a greater distance and deeper in the chest. The pulsations will also be found unequal, irregular, intermittent, or laborious, not only on auscultation, but also upon applying the hand over the præcordia. I have already imputed the bellows sound in pericarditis to changes in the valves and orifices of the heart—to alterations within the organ. This sound has been differently accounted for by Dr. Hope and others. But it will be found (and Dr. Watson and M. Bouillaud confirm the opinion) to proceed in every case from the cause now assigned; this cause itself resulting from internal carditis preceding, accompanying, or following the inflammation of the pericardium. In such cases, the internal carditis may be limited to the valves or to the orifices, or may affect both, or may extend also to the surface of one or more of the cavities. When the affection of the internal parts is merely an extension of the inflammation from the pericardium to them, this limitation to the valves and orifices is the more likely to exist. It is manifest from this, that the recognition of the different sounds is of great importance in ascertaining the extent and association of inflammations of the heart.

102. (*b*) The *sympathetic or general symptoms*, when duly weighed, are of the utmost importance in pericarditis, and particularly when estimated in connexion with the local and auscultatory signs; but they present the utmost diversity, arising from the intensity and complication of the disease.—*a*. In the acute state, a more or less violent *febrile commotion* is usually observed to follow chills or rigours. The *pulse*, at the commencement, is generally strong, full, quick, and hard; and the *skin* is hot, but perspirable. The pulse afterward becomes unequal, oppressed, irregular, small, and rapid, and often intermittent, especially at an advanced stage. Sometimes it presents more or less of these latter characters from the first; and the skin is then hot and unperspirable; but occasionally the extremities are cold, or are covered with a cold perspiration. More or less *anxiety* at the præcordia is complained of; and it generally increases, and is almost insupportable, causing extreme restlessness and agitation. *Dyspnœa*, an anxious respiration, and a feeling of overwhelming oppression are also present, with frequent sighing, which gives momentary relief. If the adjoining pleura is implicated, respiration is hurried, short, and shallow, sometimes interrupted by broken sighs, or by deep, catching inspirations. The patient has a sense of suffocation, of constriction, of internal heat, and of fulness in the præcordia and towards the left side, occasionally accompanied or alternating with acute or lancinating pain, or with jactitation. *Cough* is not always present, unless the disease is associated with pleuro-pneumony or pleurisy, and it then has the characters usually observed in these diseases. *Blood* taken from a vein, especially when pericarditis is thus complicated, or when it is connected with acute or articular rheumatism, is cupped and very remarkably buffed, the coagulum being firm. The *pulse* commonly ranges from 120 to 150, and the respiration from 35 to 45 in a minute. *Watchfulness* is generally distressing; and if the patient fall asleep, he suddenly awakes in a state of agitation and alarm. The *countenance* is pale, anxious, constricted,

* [Dr. Pennock remarks (*Am. Ed. of* Hope *on the Heart*, Phil., 1842, p. 177), that "the friction sounds in well-marked pericarditis are almost always double, and frequently may be even triple, or more; for when effused lymph is attached to the pericardial surfaces, each division of the heart, during its systole, moves so as to cause a friction upon the opposed surface of the pericardial sac; and during its diastole a similar rubbing may exist, although in an opposite direction. Now, since the auricular movements are independent of those of the ventricles, their movements, also, are double; so that, if friction exist both upon the auricular and ventricular surfaces, the attrition sounds will be quadruple, or double with the auricles, and double with the ventricles. The friction sound generally ceases in a few days, for the lymph is absorbed, or it is converted into a false membrane, which connects the heart with the pericardium. When mucous or crepitant ronchi exist over the præcordial space, the crackling sound often bears some resemblance to that of friction, rendering it doubtful whether the morbid sound occurs during respiration, or whether it is caused by attrition. This doubt may be resolved by requesting the patient to hold the breath for a short time, and examining the præcordium at that moment; if it be found that the sound has then ceased, it has evidently been generated in the lungs; but if it continues, it is friction sound."]

† [Dr. Watson (*Lectures on the Principles and Practice of Physic*, Phil., 1844) describes this as a *to*-and-*fro* sound, or "one conveying to the ear the notion of the rubbing of two rough surfaces backward and forward upon each other. It seems near to the ear, and, therefore, near to the surface of the patient's body. Like all the other morbid sounds heard within the chest, it is capable of much variety in tone and degree. Sometimes it very closely resembles the noise made by a saw in cutting through a board. Sometimes it is more like that occasioned by the action of a file, or of a rasp, or of a nutmeg-grater. But its essential character is that of alternate rubbing: it is a *to*-and-*fro* sound." —(*Loc. cit.*, p. 611.)]

and sunk; but it is sometimes, especially as the disease advances, equally pale or equally red; it is always expressive of distress and solicitude. Occasionally the muscles of the face are convulsed, or contracted so as to give rise to the *risus sardonicus*. Although strong palpitations are usually present, particularly in the early stage, they are seldom much complained of. The patient generally assumes the supine posture, or lies upon the right side, with the head and shoulders considerably elevated. Most of the above symptoms are aggravated by motion, by compression of the chest, by turning on the left side, and by a high temperature. To these supervene, if the disease be not arrested in a very few days, singultus, sometimes temporary or slight delirium—more rarely maniacal excitement, or attacks of general convulsions. If the malady continue for several days, the face becomes pale, wan, turgid, or livid, and œdema of the extremities and other symptoms indicative of organic change of the heart are observed.

103. *β.* In acute pericarditis, other symptoms, much less constant than most of the above, are often observed; while others, which usually attend symptomatic inflammatory fever, as loss of appetite, thirst, loaded or foul tongue, costiveness, and scanty, high-coloured urine, are seldom absent. *Vomiting* is an occasional symptom, and is observed chiefly in the most violent cases, and when pericarditis is *complicated* with inflammation of the diaphragmatic pleura. Indeed, the above violent state of constitutional commotion is most frequently seen in this complication, many of the symptoms depending more upon the latter than upon the former. *Hiccough*, delirium, and convulsive motions of the muscles of the face are also more frequent when the disease is thus associated. The course of this complication is often rapid, and its termination fatal when its nature is not recognised sufficiently early. When vomiting is urgent, and the pain in the epigastrium is severe, and accompanied by tenderness, the disease may be mistaken for gastritis; and the consequent singultus and restlessness; the rapid, weak, and irregular pulse; cold sweats on the extremities, &c., may be attributed to the unfavourable termination of this latter malady. In a case of this kind, which ended fatally in a few hours after medical aid was required, and which I saw only once, the disease was thus mistaken by me. But this occurred many years ago, and in circumstances which precluded a minute inquiry into the local signs.

104. *γ.* Many of the symptoms, also, especially the bellows sound; the rapid, weak, small, tremulous, and irregular pulse; the tendency to syncope on motion; the disaccordance between the pulse at the wrist and the actions and impulse of the heart as felt at the præcordia; the extreme anxiety and restlessness, &c., may be referred chiefly to the co-existence of inflammation in the adjoining substance of the heart or in the orifices and valves. Extreme or constant dyspnœa; the dulness on percussion; the weak and diffused impulse of the heart; the obscure or deep-seated sounds, &c.; the smallness, weakness, and irregularity of the pulse; the tumid, bloated, and livid state of the countenance; and the fulness of the jugular veins, are to be attributed chiefly to effusion into the pericardium and pleura, especially into the former. If faintness or syncope occur independently of motion, the pulse nearly disappearing, or becoming tremulous and intermittent, the formation of polypous concretions in the cavities of the heart may be suspected.

105. *δ.* In some uncomplicated cases, acute pericarditis has run its course without the constitutional symptoms having been at any time very severe; but in these, the anxiety, oppression, or constriction at the præcordia; the state of the heart's action and of the circulation, especially the rapidity and irregularity of the pulse, will arrest the attention of the practitioner, and lead to a more minute examination of the local signs. The more prominent symptoms of an associated pleurisy or pleuro-pneumony may mask those of pericarditis, or the one disease may be mistaken for the other; but as the treatment ought not to be thereby rendered more inert, the consequences will not be serious. When the attention is alive to this complication, and to the points of resemblance between these diseases, the distinguishing characters of each will be generally ascertained; inattention alone will mislead. Even in the most obscure cases of pericarditis, the recognition of one or two symptoms that cannot fail of taking place will generally lead to the detection of others which are pathognomonic, if they be properly inquired for; and pain or tenderness on pressure at the left side of the epigastrium, &c. (§ 96), the morbid sounds discovered by percussion and auscultation, and the disordered state of the circulating and respiratory functions just mentioned, will indicate the nature of the malady. The more acute and fully developed states of pericarditis can be mistaken only for inflammation of the diaphragmatic and left pleura; but a careful observation of the local and general symptoms will readily show the difference between them, and detect them when associated with each other. The sole error that can take place in the diagnosis when they are thus associated is, to recognise only one of them; but this will not affect the treatment, and not very materially the prognosis. The most serious mistakes are most likely to occur with respect to simple pericarditis, particularly when the local symptoms are slight; for it has occasionally happened that this disease has been found after death, although it was not suspected during the life of the patient. In this case, it is doubtful whether the error in diagnosis has been owing more to the latent nature of the malady than to the inattention of the medical attendant.

106. *ε.* Pericarditis may, from the commencement, exist in a *slight* or *mild form*, when its detection is very difficult, and it is very liable to be neglected. It then generally assumes a *chronic state*. Owing to the absence of manifest local symptoms, to the slight febrile symptoms attending it, and to the patient's neglect of his ailments, it has also been termed *latent* or obscure. Yet the disease may exist in a slow or chronic form, and manifest evident signs of its nature from its commencement; but this is comparatively rare. The chronic state may also be consequent upon the acute; especially when the latter has been too long neglected, or

treated with too little decision, or when the patient's constitution or previous health has been impaired. If, owing to these latter circumstances especially, the inflammatory action has terminated in effusion or in suppuration, the chronic or sub-acute state will often follow, and will generally be indicated by the usual signs of effusion into the pericardium; by pain, however slight, and tenderness in the situations particularized above (§ 96); by slow fever, characterized by exacerbations in the evening or after a meal; by a frequent, weak, and irregular pulse; by more or less weight, or oppression, or anxiety at the præcordia; and by a bloated or livid countenance, œdema, &c.

107. (c) When *false membranes* or *adhesions* have formed in the course of *chronic pericarditis*, the symptoms are generally obscure, and the diagnosis difficult. The inflammatory action which produced these changes, with the attendant symptoms, may have subsided, or may not have been clearly manifested at any time. Yet I have met with cases in which the existence of these alterations appeared evident; and chiefly from the following circumstances: 1st. The history of the case, and of the symptoms referrible to the præcordial region, and to the functions of the heart and of the adjoining organs; 2d. The frequent connexion of these symptoms with articular rheumatism; 3d. The presence of a true creaking sound, or a sound resembling that produced by new leather; 4th. An undulation or pulsation observable at the termination and to the left of the ensiform cartilage of the sternum, the upper and left part of the epigastrium being drawn inward and upward at each systole of the heart; a similar appearance being sometimes also observed in the intercostal spaces of the left floating ribs, particularly in thin persons; and, 5th. A superficial and diffused scraping or rough friction sound heard upon auscultation.

108. The connexion of the true *creaking sound* with thickening of the cardiac portion of the pericardium, or with a dense and elastic false membrane formed on its surface, has been already noticed (§ 100). The undulation or *pulsation* in the situations just mentioned has been observed by me in two or three cases, and in the very remarkable instance above alluded to (§ 12), where the lower part of the sternum and the anterior margins of the left lower ribs were drawn inward, or towards the spine. The *scraping sound* occurs only when the productions on the surface of the pericardium have assumed an unequal, cartilaginous, or even an osseous form; and when the symptoms referrible to the heart have existed for a long time. But in most of the cases in which I have observed either organized false membranes or adhesions in the pericardium, disease of the valves or orifices, and other organic lesions of the organ have also been present, as will be noticed in the sequel.

iii. Inflammation of the Structure of the Heart.—Syn. *Carditis, Carditis vera, Incandentia Cordis*, Auct. var.; *Inflammation of the Substance of the Heart, True Carditis.*

109. Charact.—*Acute fever, with burning pain or soreness in the cardiac region, with tenderness on pressure, particularly at the epigastrium; palpitations, tumultuous and very irregular actions and intermissions of the heart, succeeded by swoonings, &c.*

110. I have ventured to state the symptoms which seem most characteristic of inflammation of the substance of the heart, although the histories of cases where this disease was the most unequivocally present have very rarely been observed with any degree of precision, the local symptoms having been altogether overlooked. One of the most remarkable instances of carditis on record, as respects the appearances after death, conveys no information as to the history of the disease farther than that it was obviously connected with articular rheumatism, so palpable a circumstance even as this having escaped the person who treated the case (*Med. Chirurg. Trans.*, vol. vii., p. 319). In true carditis, the cellular tissue connecting the other textures seems to be principally affected. Some doubts, however, have been entertained as to the inflammation commencing in this tissue; but there is no reason that it should not originate in this, as in the other textures of the organ. It is very probable that it most frequently begins in either the internal or the external surface, and extends thence to the connecting cellular tissue, and to the whole parietes of one or more compartments of the organ. It may even commence both in the substance and in either of the surfaces simultaneously; it certainly is very rarely or never limited to the former; inflammation of the substance of the heart being always accompanied with pericarditis or with endocarditis, or even with both. The appearances after death, as well as the symptoms, vary remarkably, according to the intensity of the morbid action in relation to the constitutional powers, to the previous health of the patient, and to the extent to which the different compartments and constituent tissues of the organ are affected by it. The consequences and terminations of the disease depend also upon the same circumstances.

111. *A. Structural Lesions in True Carditis.*—The earlier changes consequent upon inflammation of the substance of the heart very rarely come before the pathologist, and even the more advanced are seldom observed. In all the cases adduced by Hildanus, Stoerck, Meckel, and Corvisart, the pericardium was also inflamed; but the state of the muscular structure of the organ has been very imperfectly described by them.—*a. Collections and infiltrations of pus* in the substance of the heart have been very rarely observed. In only two or three cases has the purulent matter been found encysted. In most instances these collections seemed to have been consequent upon acute or sub-acute inflammation; the structure of the organ being of a reddish brown hue, softened, and injected. In other cases, especially when the matter was surrounded by a distinct cyst, the symptoms were less acute, and those referrible to the heart much less prominent, or altogether latent. In nearly all the instances where this product of inflammation was found, the surfaces, or the valves, or orifices, also presented indications of their participation in the morbid action.*

* 1. Corvisart (*Opus cit.*, obs. 37) adduces a case in which, after fever attended by dyspnœa, pain in the head, præcordia, and left thorax, with anxiety, a feeble, irregular, and intermittent pulse, and delirium, death took place on the seventh day. The pericardium was found distended by purulent matter, the structure of the heart being soft-

112. *b. Gangrene* consequent upon true carditis has been noticed by Senac, Corvisart, Portal, Leroux, and Kennedy. It is manifestly a *post-mortem* alteration, accelerated by a depraved habit of body. All the cases adduced by these writers show that the inflammation of the heart was preceded by serious constitutional disturbance, and by a morbid state of the circulating fluids that had favoured the occurrence of this termination, which had taken place either at the moment of dissolution, or soon afterward. M. Portal states that, when the muscular structure of the heart becomes gangrenous, it is softened and impregnated with an ichorous and greenish serum, and that it exhales a fœtid odour. He believes that it may even be the seat of a kind of dry gangrene, and adduces a case in support of this opinion: A man of about fifty, in the course of a periodic fever, experienced palpitations and other signs of cardiac disease. He died somewhat suddenly, and, on dissection, the substance of the heart was found to be remarkably soft and friable. It exhaled a putrid odour, was easily torn, and was devoid of serum. The instance adduced by Dr. Kennedy was characterized during life by previous cachexia; by burning heat at the præcordia, ushered in by rigours; by exhaustion, restlessness, and extreme anxiety; by dyspnœa and palpitations; by a small, hard, rapid, irregular, and, lastly, intermittent pulse; by a parched, rough, and black state of the tongue, mouth, and fauces; by leipothymia, and by other symptoms of putro-adynamia. *Eight hours* after death, the heart was found remarkably dark; its substance breaking down when pressed gently with the finger. It exhaled a putrid odour; no blood exuded from its vessels; and all its cavities were empty, the large thoracic and abdominal veins being loaded with black, grumous blood.

113. *c. Softening* of the substance of the heart is one of the earliest alterations consequent upon inflammation of it; but softening, unconnected with vascular congestion and discoloration, cannot be altogether attributed to this state of morbid action. *The reddish-brown softening* sometimes observed is manifestly owing to the most acute form of inflammation; the muscular substance of the heart being of a reddish, brownish, or livid hue, and the connecting cellular tissue injected or engorged with dark blood. Sometimes blood of a very dark colour, and more or less altered, is found infiltrated between the muscular interstices, or underneath the serous membranes covering the internal and external surfaces of the organ, these membranes participating in the morbid action. In a case examined by Mr. Stanley, the muscular fibres were found of a very dark colour, of a very soft and loose texture, and easily separated and torn by the fingers, the nutrient vessels being loaded with venous blood. A section of the ventricles presented numerous small collections of *dark-coloured pus* among the muscular fasciculi. Some of these were seated near to the cavity of the ventricle, while others were more superficial, and had elevated the reflected pericardium from the heart. The muscular fibres of the auricles were also softened, and loaded with dark blood.

114. *d.* M. Bouillaud has described two other varieties of softening of the heart, which he believes to arise from inflammation. In the one, the muscular structure is of a *whitish*, or *pale-gray* colour; in the other, it is of a *yellow* hue. *Whitish* or *grayish* softening he supposes to be the second stage of the reddish-brown softening, and to indicate a farther advanced stage of carditis. That such is the case, appears partly proved by its connexion in some instances with suppuration, or purulent infiltration of the muscular tissue of the organ, although attended by much less vascular injection and congestion than the reddish-brown softening. Corvisart remarks that carditis renders, after a time, the muscular structure of the heart soft and pale; the fibres losing their cohesion, and the connecting cellular tissue becoming loose, or infiltrated by a lymphatico-puriform matter. The parietes of the heart are torn with the greatest ease, and are broken down with the least pressure. (*Op. cit.*, p. 257.)

115. The *third* variety, or *yellowish* softening of Laennec and Bouillaud, often is manifestly connected with chronic true carditis, although

ened and infiltrated with a similar substance. 2. In a very instructive case recorded by M. Raikem (*Bullet. de la Faculté*, l'an. 1809), violent pain and anxiety in the cardiac region, palpitations, dyspnœa, and leipothymia, consequent upon rheumatism and rigours, were complained of. To these were added a bloated and anxious countenance, distention of the jugular veins, small and frequent respiration, irregular and excited action of the heart, pain at the epigastrium, and vomitings, followed by delirium, and by death about the fourteenth day. The heart was found large and flabby. Signs of inflammatory action were observed in its left valves and orifices. Its substance was of a reddish brown hue, injected, and contained three or four small collections of an opaque sanious pus. 3. M. Simonet has recorded a case in which the disease was connected with rheumatism. When the patient was brought to the hospital, the action of the heart was tumultuous and extensive, the pulse contracted and irregular, the respiration difficult, and the extremities cold. Blood-letting was practised; but he died a few hours afterward in a fit of syncope. Purulent collections were found in the substance of the heart, especially in the interventricular partition. The internal surface of the cavities was red in several places; the muscular structure being of a yellowish gray hue, softened, and torn with the least effort. (Bouillaud, *Op. cit.*, p. 266.) 4. Dr. Graves was consulted by a gentleman, fifty-five years of age, who had complained for many months of palpitations and dyspnœa, and more recently of anasarca. Severe pain and anxiety were felt at the region of the heart, the former darting over the chest. Dr. Graves detected hypertrophy and dilatation of the ventricles, with a loud bellows sound, the purring tremour, and a very irregular pulse; and inferred the presence of disease of the valves. The patient died suddenly a few weeks afterward. There were found considerable effusions of serum in both pleural cavities, enlargement of the heart, and adhesion of it to the pericardium by bands of coagulable lymph, which were strong at the apex. At this situation was discovered a cavity in the muscular structure, with a regularly defined wall, which contained about two ounces of pus. The parietes of both ventricles were greatly thickened. All the valves were more or less affected. The valves of the aorta were nearly altogether ossified. (*Lond. Med. and Surg. Journ.*, vol. vii., p. 803.) 5. In a case detailed by M. C. Broussais (*Annal. de la Méd. Physiol.*, t. xxi., 1832), the abscess in the substance of the heart was *encysted*. A soldier, nineteen years of age, was attacked with smallpox, in the course of which abscesses, enormous infiltration of the left arm, probably caused by a consecutive phlebitis, &c., supervened. A constant fever, with anxiety, marasmus, &c., ultimately became the principal symptoms. He died on the fifty-fifth day from the attack. An abscess, of the size of a filbert, was found in the muscular substance of the left ventricle, near its base. The matter was well-digested pus, which was contained in a consistent cyst. 6. M. Laennec found a similar abscess in the substance of the left ventricle of a child who died of pericarditis. A case resembling the foregoing is also recorded by Henning (Hufeland's *Journ. der Pract. Arzneyk.*, b. vii., st. iv., p. 144). Two cases are recorded by M. Marechal, in which purulent collections were formed in the cavities of the heart, connected with their internal surface, and surrounded by a thin, friable membrane. The patients had experienced symptoms referrible to the heart during the latter days of existence. (*Journ. Hebdom. de Méd.*, t. ii., p. 494.)

by no means generally. It differs from the former (§ 114) only in its yellow colour; and is most frequently greatest in the interventricular septum, and the centre of the muscular structure of the ventricles; the parts nearest the internal and external surfaces of the organ being less evidently changed, or presenting reddened points of the healthy consistence. The second of these forms of softening was observed by me in a patient who died of the consequences of inflammation of the membranes of the spinal chord, many months after having experienced an attack of acute carditis, connected with articular rheumatism (see *Lond. Med. Repos.*, vol. xv., p. 26); and, judging from the appearances in that instance, this softening seemed to result from a change in the nutrition of the organ, consequent upon the antecedent inflammation of it. Bouillaud considers that its frequent coincidence with purulent effusion into the pericardium shows that it depends upon this latter circumstance. The juster inference would be to impute both the change in the substance of the organ and the morbid secretion from the pericardiac surface to perverted vascular action, conjoined with impaired organic nervous power. That these are the true pathological conditions, is shown by the circumstances in which this as well as the yellowish variety of softening is found. I have observed them both—this latter variety especially—where there had been no evidence of cardiac disease, either at any previous period or in a chronic form; and particularly in cases of general cachexia, and of constitutional disease, attended by discoloration of the surface of the body, by a bloodless, yellowish, or tallowy or waxy appearance of the integuments, and by other signs of a poor and deficient state of the blood, consequent upon impaired organic nervous energy and assimilation, as generally seen in the advanced stages of local malignant or contaminating maladies.

116. *e. Ulceration of the heart* may arise from an abscess, encysted or non-encysted, having opened either into one of the cavities, or into the pericardium. In the former case, the purulent collection, and the subsequent secretion from the diseased part, mix with the blood; in the latter, they accumulate in the pericardiac cavity, and increase a pre-existent pericarditis. M. Bouillaud supposes that they may open both ways, and occasion *perforation* of one of the compartments of the organ. It is more probable that, after opening in one direction, the tissue surrounding the abscess gives way, owing to the loss of substance, and to the softening consequent upon this lesion. That many of the cases of *rupture* of the heart arise from this circumstance will appear in the sequel. Ulcerations are generally observed in the internal surface, most commonly in that of the left ventricle. Inflammation having commenced in, or extended to the connecting cellular tissue, and having given rise at one or more points to an effusion of a serous or puriform fluid sufficient to detach the internal membrane from its vascular connexions, this membrane necessarily loses its vitality at these points, and yields before the matter underneath it. Erosion of the endocardium, followed by ulceration, and limited softening, &c., of the substance of the organ, is thus produced; the number, extent, and depth of the ulcers being various.

117. Ulceration, in its course through the substance of the heart, gives rise to changes analogous to those observed after ulceration of arteries. The thinned and softened portion of the parietes yields before the pressure made upon it by the column of blood, and a *sacculated aneurism*, or *tumour*, varying from the size of a filbert to that of a large orange, is formed; its cavity, as in the case of other aneurisms, being often, in a great measure, filled with lamellated coagula. The aneurismal tumours consequent upon ulceration generally form adhesions between the opposed surfaces of the pericardium stretched over them, their rupture being thereby prevented. They have been found only in the left ventricle; and, according to M. Breschet, the summit of the ventricle is their sole seat; but M. Reynaud has shown, by the analysis of thirteen cases, that seven are exceptions to this rule.

118. *f. Perforation* of the parietes of one of the compartments of the heart may occur in either of the ways above described; from ulceration consequent upon abscess; from simple ulceration following inflammatory action; or from ulceration attended by an aneurismal tumour. It seldom, or never, perhaps, proceeds from the last of these, for the reason just assigned; and whenever it does take place in either of the former cases, rupture or laceration of the remaining inflamed and softened tissues in the seat of ulceration usually takes place. When the perforation is made into the pericardium, death occurs suddenly; but when it is seated in the interventricular septum, then an admixture of arterial with venous blood results, and life may be prolonged for some time. Instances of perforation from ulceration have been recorded by Rullier, Andral, and others. M. Maruejouls met with this lesion in the left auricle.

119. *g. Induration* and *cartilaginous* and *osseous transformations* of the substance of the heart are doubtless among the more remote or chronic lesions consequent upon carditis. Simple *induration* varies in degree and situation, and is generally limited to, or is most remarkable in a single compartment. It may be seated in the parietes of a ventricle, or in those of an auricle, or in the septa, or in the fleshy columns. Corvisart, Laennec, and Broussais have observed it to equal that of the shell of a nut. It is, however, most frequently characterized by a transformation into a *cartilaginous*, or an *osseous*, or *osseo-calcareous substance*, and limited to a portion only of a compartment. The connecting cellular tissue, especially that beneath either of the membranes, seems to be the original seat of this change, the muscular fibres being atrophied from the pressure of the indurated, hypertrophied, or transformed cellular tissue connecting them. The cartilaginous and osseous degenerations of a portion of the substance of the heart have been observed by Morgagni, Haller, Senac, Corvisart, Baillie, Filling, Renauldin, Bichat, Bertin, and many others. They are, however, much more frequently met with in the pericardium. The most remarkable instance of ossification of the muscular structure of the heart is recorded by A. Burns. In general, when ossific deposites are found in this latter situation, they seem to have only extended to it from either of the sur-

faces, especially the pericardiac, or, rather, from the cellular tissue subjacent to these surfaces, to that connecting the muscular fasciculi, which become atrophied as the osseous or cartilaginous change proceeds. This seems well illustrated by an interesting case recorded by Mr. Smith (*Dublin Journ. of Med. Science*, vol. ix., p. 419).

120. That the change of a portion of the substance of the organ into the cartilaginous or osseous states is actually the result of a form of chronic inflammatory action, seems to be proved by what is observed in connexion with these lesions in other situations, and by the circumstances of their association with increasad vascularity and swelling in hypertrophy of the parts in which they are seated, and of their occurrence after undoubted evidences of inflammation had been manifested. That the state of the circulating fluids may, however, be indirectly concerned in the production of these changes, as consequences of chronic inflammatory action, in preference to any other, is not improbable; the superabundance in the blood, owing to impaired eliminating function of those substances or ultimate products of assimilation, which contribute to the formation of the morbid depositions in question, possibly favouring their supervention.

121. *B. The Symptoms and Diagnosis of true Carditis* are so little different from those of internal and external carditis, that nothing precise can be advanced under this head. The circumstance of inflammation of the substance of the heart occurring chiefly as a consequence, or as a complication of inflammation of either or of both the surfaces, nearly precludes the possibility of distinguishing between it and them, or of ascertaining its existence when thus associated, more especially when the disease exists in a sub-acute or chronic form. This difficulty has been acknowledged by Corvisart, Laennec, and Bouillaud. M. Laennec very justly remarks that there is not on record a single case of carditis the symptoms and course of which have been accurately observed. M. Bouillaud states that he has never met with a case of carditis uncomplicated with pericarditis or endocarditis. It has been supposed that the dark softening of the structure of the heart, so very frequently observed after death from adynamic or putro-adynamic fevers, has been owing to the complication or supervention of inflammation of this organ. The uncommon frequency of the pulse in many of these cases has been considered as evidence of this; yet the slighter forms of simple endocarditis would give rise to the same symptoms, and these, very probably, not infrequently occur in the course of those fevers, modified, however, by the constitutional malady, although in general the heart's substance undergoes no farther change from them than other organs. In the advanced stages, or near the termination of these diseases, the heart participates in the alterations which take place in muscular parts generally, and becomes more or less softened and discoloured. This change, however, is independent of inflammation, and is the consequence of extremely depressed vital power, and impaired cohesion of the soft solids (see Fever, § 18, 102), in connexion with deterioration of the circulating fluids. This change of the substance of the heart is also not infrequent in cases where the blood has been altered by the absorption of morbid matters, or by the infectious operation of putrid and contaminating fluids and miasms. I have remarked it in the putro-adynamic, or liquescent form of remittent fever endemic in low, marshy districts within the tropics, and in the more malignant states of puerperal fevers, especially those met with in crowded or ill-ventilated lying-in hospitals (see Puerperal Diseases). Several writers on the plague state that they have observed it in fatal cases of that pestilence. I also have found it after death from pestilential yellow fever, and in a slighter degree from pestilential cholera. (See art. Pestilences.)

122. *a.* Notwithstanding the difficulty of determining the existence of carditis during the life of the patient, Drs. Heim and Krause believe that a diagnosis may be made in some instances; and, judging from two cases in which I was consulted, and in which the opinion as to its nature was confirmed by the appearances observed after death, I nearly concur with them, especially if the disease exist in a very acute and fully developed form. In this case the patient experiences a violent pain in the region of the heart, with anxiety, preceded or attended by rigours, chills, or tremblings of the whole frame. To these succeed increased heat about the præcordia, or in the trunk, while the extremities and face are cold, and the whole surface is covered by perspiration, which is cold on the extremities. The pain is concentrated in the situation of the heart, is lacerating or rending, accompanied by the utmost agitation and expression of anxiety and distress, sometimes by screams, and occasionally by general convulsions and swoonings. The patient feels every pulsation of the heart, rolls about to obtain ease, and presses his hand forcibly against the præcordia. The chest is elevated, the head thrown back, and the face and hands covered with cold sweats. There is great thirst, but drink is refused on its reaching the lips; and there is often loquacity, passing into delirium as the disease advances. If no vascular depletion has been practised, the pulsations are indistinct, or fluttering, or tumultuous. After blood-letting, the action of the heart becomes more developed; palpitations, attended by intense suffering, occasionally take place, and at other times syncope supervenes, or they both alternate. Immediately upon opening a vein, syncope or convulsions are apt to occur; but, upon placing the finger on the orifice till the patient recovers, the depletion can be carried to a great amount, with relief to all the symptoms. The pulse varies remarkably, but is generally unequal or irregular, and remarkably small and weak, or indistinct. There is neither cough nor expectoration, nor vomiting, but a frequent expression of pain and distress. The pain is increased by each contraction of the heart, so as to cause the patient to complain of palpitations, even when the impulse is not sensibly increased. If the disease is not soon arrested, constant jactitation or tremour, recurring fits of syncope, delirium, and death take place; or, in consequence of the association with it of inflammation of the internal or external membranes, and of the effusion of lymph, the phenomena, local and general, observed in the ad-

vanced stages of internal and external carditis, supervene and constitute the chief characteristics of the malady. When acute carditis is associated with either of the other varieties, or passes into them, then the local and physical signs proper to each will be detected, accordingly, on percussion and auscultation.

123. These are the most constant phenomena of acute carditis, according to the description of Dr. Heim, and the history of two cases which fell under my observation. The seizure is generally sudden, and the disease reaches its acme about the third day. In one of my cases, death took place on the fourth day. The patient (who was attended also by Dr. Walshman and another practitioner) was about fifty years of age, and of a full habit of body. In the spring of 1821, while labouring under an attack of rheumatism, he was recommended by some person to take a strong dose of croton oil. He took three drops, which produced violent purging and vomiting. The rheumatism suddenly ceased, and was speedily followed by the most distressing pain and anxiety in the region of the heart, and entirely confined to it. There was no morbid sound on auscultation, although nearly all the symptoms enumerated above were present. The patient was repeatedly bled, but extreme restlessness and jactitation appeared, and death by syncope soon afterward took place. On dissection, the pericardium presented hardly any signs of inflammation, but the substance of the heart was inflamed, and portions of the internal surface more slightly. The alterations, however, were not so extensive as was anticipated, probably owing to the activity of the treatment, as medical aid was promptly procured, and the disease at once recognised, and to the rapidity of the fatal termination. In the other case, which occurred more recently, and which was of longer duration, dark softening, as described above, was very remarkable, with the usual products of inflammation on both the internal and external membranes, particularly the latter.

124. *b. The consecutive alterations* on true carditis are even more occult than the acute stage of the disease itself. Indeed, as these alterations most frequently proceed from a subacute or chronic state of carditis, or from inflammation limited to one or two compartments of the organ, their greater obscurity is to be anticipated. When *abscess* or *ulceration* is followed by *perforation* or *rupture*, then sudden death takes place, unless the alteration occurs in the interventricular septum. But the symptoms attending these lesions previously to their reaching a fatal extent have not been ascertained, and it is doubtful whether or not they admit of being distinguished. It is necessary to this end, that cases of this kind should be carefully observed and accurately described; but there is none on record possessed of either of these qualities. The same observations apply to the *sacculated dilatation* or *aneurism* of the heart (§ 117), consequent upon ulceration or abscess. In none of the cases of it which have been published was this lesion either discovered or suspected during life. M. Breschet mentions only the signs that may be expected to occur, not those which have been actually observed; and M. Bouillaud advances no farther. In the case detailed by M. Reynaud, an affection of the heart was never indicated, the patient having died of a severe nervous disease, caused by the oxyde of lead, in a manufactory where he wrought; and the cases adduced by the authors referred to hereafter furnish quite as little information.

125. *c. Softening* of the heart, consequent upon various grades of inflammatory action, is indicated by a few symptoms, which, when duly weighed in connexion with the previous history of the case, may lead the acute physician to presume its existence with some truth. These symptoms, however, taken by themselves, often attend other diseases characterized by extreme asthenia, and even the asthenic functional disorders of this organ (§ 39). But when, after more or less acute or sub-acute symptoms referrible to the præcordia, especially if attended by any of the morbid sounds, or other physical signs observed in external or internal carditis, or after dyspnœa, &c., the impulse of the heart at the præcordia, and the pulse at the wrist, become obscure, weak, and irregular, the latter being small or indistinct, the face livid or tumid, and the extremities œdematous, the dyspnœa increased or more constant, and when fainting or syncope occur frequently, or from very slight causes, then softening of the muscular structure of the heart may be presumed. Still, all these symptoms may depend upon effusion into the pericardium, which, however, is often associated with softening of the organ. But a careful examination of the chest by percussion and auscultation, and the diagnostic symptoms adduced in the article on Dropsy of the Pericardium (§ 151), will often lead to a just conclusion. The softening of the heart, which, in a slighter degree, may be presumed to exist during convalescence from low or malignant fevers, is generally attended by a small and quick pulse, by a very weak and limited impulse, and by frequent returns of faintness or syncope. In the softening observed in very old people, the pulse is often slow, feeble, indistinct, or intermittent, or irregular; and dyspnœa, with many of the symptoms just mentioned, is generally present.

126. iv. *Of the Causes and Development of Inflammations of the Heart and Pericardium.*—Inflammations of the *surfaces and substance of the heart* arise from the same *predisposing* and *exciting causes*. When either of these forms of carditis proceeds directly from these causes, or independently of a pre-existing malady, it has been denominated *primary* or *idiopathic*; but when it has followed another disease, and when a connexion can be traced between both, it has been called *consecutive* or *symptomatic*. The *causes* already adduced under the heads of *predisposing* (§ 18) and *exciting* (§ 19) are principally concerned in the production of the primary states of these inflammations. Some of those which have been termed *pathological* (§ 20) chiefly occasion the consecutive forms of carditis.

127. *A.* Of the *predisposing causes* (§ 18) already stated, plethora, the rheumatic and arthritic diathesis, the irritable and sanguineous temperaments, hereditary constitution, mental emotions, and early age, seem to be most concerned in producing inflammations of the heart and pericardium. Although these diseases may occur at any age, yet they are most frequently

met with between the ages of six and thirty-five. M. BOUILLAUD assigns the period between ten and thirty as that of their most common occurrence. I have, however, observed a large proportion of cases between five and ten years of age, and after thirty. I agree with him in considering them most frequent at those seasons when the vicissitudes of temperature and season are the greatest, and, I may add, during spring, when northeast winds are most prevalent.

128. *B.* The *exciting causes* (§ 19) comprise nearly all those just referred to, especially the mechanical, the traumatic, the physical, and the moral exciting causes. Of the *physical* causes, the most common are, exposure to cold when the body is perspiring, or after it has been much overheated or excited, and wearing damp clothes, or sleeping in damp sheets or beds. The impression of cold after the copious transpiration and exhaustion caused by bodily or mental exertion, or by both conjoined, is very apt not only to produce inflammation of either of the surfaces of the heart, but also to occasion pneumonia or pleuritis to be associated with it. A young man of talent, after addressing a meeting under great mental excitement for upward of an hour, exposed himself immediately to a cold easterly wind in the month of March, and was soon afterward seized with pericarditis, complicated with pleuritis of the left side. A middle-aged man, after great muscular exertion and fatigue, allowed himself to be suddenly chilled: he was afterward attacked by internal carditis, which soon became associated with pericarditis. The dangerous and often fatal consequences of violent or prolonged exertions in working the pumps of leaky or sinking vessels are generally owing to the production of this malady in its most acute form. Of the truth of this, the author had, many years ago, a painful opportunity of assuring himself. The *moral causes* enumerated above (§ 19 (*c*)), and in the article DISEASE (§ 53), sometimes either induce, or concur with other causes in occasioning one or other of the forms of carditis.

129. *C.* The pathological states which have been adduced (§ 20) are by much the most common causes of inflammation of the internal and external surfaces of the heart; and of these the most frequently observed is *rheumatism*, particularly the *acute articular form* of that disease. Internal or external carditis may be connected with rheumatism in *three* modes: 1st. The cardiac inflammation may follow the disappearance or suppression of the rheumatic affection, and may thus appear as a *metastasis*, or translation of this affection; 2d. It may take place before the rheumatic disorder has ceased in an extremity or external part of the body; and co-exist with this disorder in one or more joints, or in these situations, the external affection being, however, much less severe after the development of the cardiac malady; 3d. Rheumatism may extend itself to the heart or pericardium without abatement in its external seat, or may affect, almost simultaneously, one or more joints, and the heart; or a very acute arthritic rheumatism may mask a subacute internal or external carditis. Of these three modes of connexion, the first and second are the most frequent; but the third is by no means rare. I believe that the more acute the rheumatic complaint, and the more it affects the joints, the greater is the risk of its occasioning carditis or pericarditis; the risk being also greater, the younger the patient: and I am moreover of opinion that this connexion between inflammations of the heart and rheumatism is much more frequent at the present day than twenty years ago.* Twenty-five years since, when I published a dissertation on rheumatism, and had my attention as alive to this circumstance as now, and with equal opportunities of meeting with it in public institutions, it was much less frequently observed. The modes of ascertaining it have certainly been improved since then; but nearly as much now is often lost by inattention to the physiological or rational symptoms as is gained by ascertaining the physical signs. Besides, as I have always resorted to auscultation and percussion since 1819, when I frequently accompanied LAENNEC in his rounds, the disease was almost as likely to have been detected by me then as now.

[DR. LATHAM states ("*Lectures on Subjects connected with Clinical Medicine, comprising Diseases of the Heart*," 2 vols., Lond., 1845) that between the years 1836 and 1840, there occurred under his care, at St. Bartholomew's Hospital, 136 cases of acute rheumatism; of which 75 were males and 61 females: and of the 75 males, the heart was affected in 47, and unaffected in 28. Of the 47, the seat of the disease was the endocardium alone in 30, the pericardium alone in 3, and both the endocardium and pericardium in 7; and while the heart was undoubtedly affected in 7 others, the exact seat of the disease was uncertain. Of the whole number of males in whom the heart was thus variously affected, 3 died; and in these 3 the pericardium and the endocardium were both inflamed. Of the 61 females, the heart was affected in 43, and unaffected in 18. Of the 43, the seat of disease was the endocardium alone in 33, the pericardium alone in 4, and both the endocardium and pericardium in 4; and the exact seat of the cardiac disease doubtful in 2. Of the whole number of females in whom the heart was thus variously affected, none died. The account of males and females taken together will stand thus:

Cases of acute rheumatism	136
Heart exempt in	46
Heart affected in	90
Seat of disease in the heart:	
Endocardium alone in	63
Pericardium alone in	7
Endocardium and pericardium in .	11
Doubtful in	9

Deaths 3; in all of whom both endocardium and pericardium were affected. Of the 63 pa-

* ["One law respecting the connexion between the cardiac and the arthritic symptoms," says Dr. WATSON, "may be stated with confidence; namely, that the younger the patient is who suffers acute rheumatism (and I have seen it so early as the third or fourth year), the more likely will he be to have rheumatic carditis. The chance of the combination appears to diminish after puberty, as life advances. I have known only *two* persons pass through acute rheumatism with an untouched heart prior to the age of puberty; and in those two, I am by no means certain that the articular disease was genuine rheumatism. In each of them the large joints became painful, and swelled, for a day or two only, towards the close of scarlet fever—a circumstance not, I believe, unusual. I was dreadfully apprehensive of carditis, but it did not occur."—(*Loc. cit.*)]

tients who suffered simple endocarditis in the course of acute rheumatism, 30 were males and 33 females, of whom none died; but auscultation showed that of these the membrane recovered its complete integrity of structure only in 17, and that it remained permanently injured in 46. Of the 30 males, the subjects of rheumatic endocarditis, the endocardial murmur ceased entirely in only 8; while it remained after they were convalescent, and as long as they continued under observation, in 22. And of the 33 females, the endocardial murmur ceased entirely only in 9, while it remained in 24. This denotes a most fearful disease in regard to its distant results, showing that the probability is as great as 4 to 1, that inflammation befalling the endocardium will become the rudiment of disorganization to the entire heart. The results of simple rheumatic pericarditis were that, of the 7 who suffered simple pericarditis in acute rheumatism, 3 were males and 4 females, of whom none died, and no exocardial murmur remained after convalescence, to denote a change of structure in the pericardium, although adhesion might exist and escape this as well as all other known methods of diagnosis.

Of the 11 in whom endocarditis and pericarditis were combined, 7 were males and 4 females; out of these, inflammation was arrested and life saved in 8; and 3 died. Of the 8, who were convalescent from this double disease, the endocardium underwent perfect reparation in 2, for the endocardial murmur entirely ceased; and imperfect reparation in 6, for the endocardial murmur continued. As to the pericardium, although the exocardial murmur ceased in all, Dr. L. thinks it doubtful whether its reparation was perfect in any, there probably remaining a greater or less extent of permanent adhesion. Thus, of these 8 cases involving both the investing and lining membranes of the heart, it is not certain, or perhaps probable, that the organ recovered a perfectly healthy condition in a single instance. The appearances on dissection in the fatal cases corresponded with those given by Mr. CORLAND.

Of 136 cases of acute rheumatism, Mr. L. also found that while the *heart* was inflamed in 90, or in two thirds of the whole, the *lungs* were inflamed only in 24, or one in 5½. These 24 cases were made of 4 of bronchitis, 18 of pneumonia, and 2 of pleurisy. Of the 46 cases of acute rheumatism in which the heart was unaffected, the lungs were inflamed in 5, a ratio of 1 to 9; and of the 90 cases in which the heart was inflamed, the lungs were also inflamed in 19, a ratio of more than 1 in 5. Of the 63 cases of endocarditis, the lungs were inflamed in 7, a ratio of 1 to 9. Of the 7 cases of pericarditis, the lungs were inflamed in 4, a proportion of more than one half. Of the 11 cases of endocarditis and pericarditis simultaneously, the lungs were inflamed in 8, a ratio of two thirds. Thus showing that, while in acute rheumatism inflammation of the lungs does not occur more frequently when the endocardium is inflamed than when the heart is entirely exempt from disease, yet that when this membrane and the pericardium are both involved, inflammation of the lungs is a frequent complication. The pulmonary affection consisted either in the existence of single or double pneumonia, single or double pleurisy, or bronchitis of one or both lungs.

Dr. CHARLES HOOKER states (*Bost. Med. and Surg. Journ.*, vol. ii., p. 336) that a remarkable change of diathesis was observed in the city of New-Haven and vicinity in the year 1830–1; and that rheumatism, complicated with pericarditis, pleuritis, &c., became very prevalent. For this, he says, the *Actea racemosa* proved a most prompt and efficacious remedy. "In the commencement of a severe case," he remarks, "a full dose of calomel was commonly administered, and this was followed by a mixture of *Tinct. Actææ*, ʒvj., and *Tinct. Opii*, ʒij., in doses of forty or sixty drops every two or four hours. Scarcely any other medication was required, whether a case was pneumonitis, pleuritis, pericarditis, or phrenitis, all of which were of a rheumatic character; and with this plan the severest cases were almost sure to come to a favourable resolution within four or six days." During the following year, the disease was also very rife, but wanting the usual acute symptoms of the affection. There was a strong predisposition to serous effusion into the pericardial sac; *post-mortem* examination revealed copious liquid effusion into the cavities of the pleura, of a straw colour, with an admixture of yellowish, albuminous flocculi. The lungs were largely infiltrated with pus and serum, with such a preponderance of the serum as to occasion an unusually pale appearance, and the degree of softening was such that the lungs could hardly be handled without breaking into a thin, pultaceous mass. The pericardium was distended with a liquid similar to that within the pleura, and in most cases the inner membrane was coated, so as to have a pale, buttery appearance. The muscular substance of the heart was remarkably softened, and in most cases paler than natural. Dr. H. remarks that the prominent feature of the disease was a tendency to a separation of the serum and fibrin, with effusion of serum; and that the principal danger to be apprehended was from serous effusion into the pericardium, the lungs, the brain, and the spinal canal. The remedies employed were, therefore, aimed to prevent effusion and promote absorption; for which purpose, after a full dose of calomel, one of the following pills was given every one, two, or four hours, according to the circumstances of the case: ℞ *Elaterii*, gr. j.; *Calomel*, gr. xv.; *Pulv. Digitalis*, ʒj.; *Pulv. Scillæ*, ʒj.; *Pulv. Cantharid.*, gr. v.; *Muc. G. Arabic*, q. s. Ft. pill, No. 40. These were continued until eight or ten copious liquid evacuations were produced, after which they were so given as to procure two or three evacuations daily. This plan, with blisters to the præcordial region and sinapisms to the extremities, was the only medication ordinarily required. In many cases, conjoined with this treatment, a mixture of *Ol. Terebinth.*, with mucilage of gum Arabic, was advantageously used; as, also, were infusions of *Senega*, *Asclepias Syriaca*, and *bac. Juniper*. This treatment, however, is not recommended as adequate to the cure of pericarditis and carditis, but was found successful under the circumstances indicated.

130. The next most frequent pathological conditions whence carditis, especially external carditis, may proceed, are *pleurisy* and *pleuro-*

pneumony. The former disease may occur in consequence of the extension of the latter, or they may both appear almost simultaneously. I have even seen pericarditis give rise to, or followed by pleuritis. Inflammations of the heart, thus associated, are most commonly caused by some one of the numerous modes in which cold is applied to the surface—or, rather, in which the animal caloric is carried off—when the body is perspiring, especially after exertion or fatigue, and in the rheumatic diathesis. *Gout* is also sometimes a cause of carditis, and, I think, of the internal form of the disease, in preference to pericarditis. Internal carditis occasionally appears at an advanced stage of, or during convalescence from either of the eruptive fevers. It, as well as other forms of the disease, may also follow other fevers, and the complaints mentioned above (§ 20).

131. v. *The* Diagnosis *of Inflammations of the Heart* may be inferred from the description I have given of the symptoms attending each of the varieties; but as these varieties are often associated with each other, or in some measure pass into one another, as the inflammatory action predominates more or less in one of the constituent tissues of the organ, so the symptoms will vary in different cases, and even in different periods of the same case. Attention, however, to the following circumstances, and groups of morbid phenomena, will generally enable the practitioner to arrive at a tolerably just conclusion as to the nature of the disease: 1st. The situation of the pain, in the more acute cases, and the tenderness, soreness, or pain on pressure felt in the left and upper part of the epigastrium, and in the left anterior intercostal spaces; 2d. The increase of pain on stretching upward or backward, and the inability to lie on the left side; 3d. The frequent extension of pain to the left axilla, shoulder, or arm, and the occasional numbness of the latter; 4th. The greatness of the anxiety in proportion to the cough; the anxious, haggard, or peculiar expression of countenance; and the bloated or livid appearance of the face at a more advanced stage; 5th. The state of the pulse at the wrist examined in connexion with the actions and impulse of the heart; the great frequency and irregularity of the latter, and the smallness, weakness, &c., of the former; 6th. The palpitations and tendency to syncope, or the alternation of these symptoms, and their connexion with pain, anxiety, dyspnœa, restlessness, or jactitation; 7th. The signs on percussion and auscultation, especially the *single bellows* or *blowing sound*, with all its modifications; and the *double friction*, rubbing and creaking sounds: the former having reference to changes within the *heart*, the latter to alterations within the *pericardium*.

132 vi. *The* Complications *of Inflammations of the Heart* have been already noticed in general terms (§ 32). Inflammation of the *internal membrane*, whether acute, sub-acute, or chronic, is often associated with, or gives rise to, *pericarditis*, at an early period of its progress; but this latter is much more frequently complicated with, or occasions the former. Signs of endocarditis are more commonly and more early detected in the course of pericarditis, than those of pericarditis are in the course of endocarditis; and both may be farther associated with inflammation of the cellular tissue or substance of the heart, or *true carditis*, in various degrees, or to a greater or less extent, as respects the different compartments of the organ. *A. Internal carditis* is much more commonly observed in a complicated than in a simple state, especially when it is at all advanced. It presents itself in connexion with the following diseases, and probably in a ratio of frequency approaching the order in which I am about to enumerate them: 1st. With pericarditis and articular rheumatism; 2d. With pericarditis only; 3d. With rheumatism only; 4th. With pneumonia, pertussis, and pleuritis; 5th. With inflammation of the blood-vessels, especially phlebitis; 6th. With eruptive or adynamic fevers; 7th. With purulent collections or caries in distant parts. Internal carditis, when associated with rheumatism or with pulmonary or pleuritic diseases, is generally also connected with pericarditis; but when it supervenes in the course of phlebitis, or of fever, or from some cause which contaminates the circulating fluids, then it is generally unconnected with pericarditis, although the substance of the heart may be more or less implicated, or even softened.

133. *B. Pericarditis* is also much more frequently met, even in its early stages, in a complicated than in a simple form—generally in connexion, 1st. With internal carditis, either acute or chronic; 2d. With articular rheumatism; 3d. With both internal carditis and rheumatism, this being oftenest observed; 4th. With pleuritis, either pulmonary, diaphragmatic, or costal; 5th. With pleuro-pneumony; 6th. With inflammation of the diaphragm or mediastinum; 7th. With true carditis; 8th. With peritonitis; 9th. With inflammation of some one of the abdominal viscera; and, 10th. With eruptive fevers. Two or more even of these complications may exist in the same case, especially internal and external carditis, pleuritis, and articular rheumatism; pericarditis, diaphragmitis, and pneumonia, &c. A body was lately brought into the dissecting-room of the Middlesex Hospital medical school, in which the liver was found inflamed and enlarged. It had formed adhesions with the diaphragm on one side, and with the adjoining viscera on the other. Between these viscera and the concave surface of the liver the adhesions formed a large sac containing a turbid serum. The *pericardium* and diaphragm were inflamed, as well as the pleura on both sides. The pericardium and pleural cavities contained much turbid, thick serum. When pericarditis is associated with peritonitis, or with inflammation of some of the abdominal viscera, the additional complication of pleuritis, especially diaphragmatic pleuritis of the same side, is not infrequent. Bouillaud adduces an instance of splenitis, diaphragmatic pleuritis of the left side, and pericarditis in the same patient. The opinion of Corvisart, that acute pericarditis rarely or never exists without being complicated, in some period or other of its course, is very nearly if not altogether true.—*C.* Of the complication of *true carditis* little farther need be added. It can hardly exist without more or less inflammation of one or both surfaces of the heart; and in the few cases of it that have been observed, several were also con-

nected with rheumatism, with pleuro-pneumony, with eruptive and other fevers, with phlebitis, and with purulent or sanious matters absorbed into the circulation.

134. vii. *Of the* Progress, *Duration, and Terminations of Inflammations of the Heart.—A.—a. Internal carditis* may be *acute*, *sub-acute*, or *chronic*, and all the intermediate degrees. The most acute form may, especially from the effects of treatment, assume a mild and very chronic state; and this latter state may acquire greater activity, and become much more severe or acute. This latter change is, however, less frequent than the former. Where an amelioration has taken place, a recurrence or exasperation of the acute symptoms is very apt to occur. The most acute cases, M. Bouillaud observed, arose from sudden chills while the body was perspiring, chiefly in persons of the lymphatico-sanguine temperament, and employed in laborious occupations; hot stimulating liquors, taken with the view of recalling the perspiration to the surface, having assisted in developing the disease. When the less severe cases appear in connexion with rheumatism, as they often do, in one or other of the modes above stated (§ 129), a stimulating treatment of the latter disease renders much more acute the cardiac affection.

135. *b.* The *duration* of endocarditis is most indefinite, and altogether dependant upon the severity of the disease, the habit of body, age, strength, and constitution of the patient, the nature of the complication, the mode of treatment, and the period of recourse to it. *Acute endocarditis* may terminate fatally in two or three days; and in this case death is caused chiefly by the formation of fibrinous concretions, or coagula, in the cavities of the heart. When complicated with pericarditis, or with pleuro-pneumony, its duration will generally accord with that observed in these diseases. The slighter or more *chronic forms* of internal carditis are of long duration, the more concealed states being prolonged indefinitely, or even for years; and organic lesions, especially of the valves and orifices of the organ, are usually the result at more or less early periods of their course. The inflammatory action either subsides or entirely ceases, after having produced these lesions, or it still continues in an obscure form. In the former case, especially when the amelioration proceeds from judicious treatment and regimen, the disease may remain, even for years, either stationary or more or less mitigated; but, in the latter, it generally advances with varying degrees of rapidity, until the functions of the organ and of the adjoining viscera are more or less impeded, or altogether interrupted; or until fatal congestions take place in vital parts, or dangerous effusions of blood or of serum supervene in important organs, or from mucous or serous surfaces.

136. *B.—a.* The *progress* and *duration* of *pericarditis* also vary with the causes which occasion the attack, with the age, temperament, and habit of body of the patient, and with the morbid connexions and treatment of the disease. The most *acute form* may terminate fatally with great rapidity. M. Andral records a case which was fatal in twenty-seven hours. The celebrated Mirabeau was carried off by it so rapidly as to lead to the suspicion of his having been poisoned: he was only improperly treated, although in the usual manner at that time in France. Such violent cases are generally complicated, either with internal carditis, or with pleuritis, diaphragmitis, &c.; or with two, or even more, of these inflammations (§ 133). The more moderate or favourable cases, however, generally terminate about the seventh or ninth day, or between the seventh and fourteenth. But there are exceptions to this. The slighter and more *chronic grades* of pericarditis may continue for some months; and the consequences, particularly adhesions, connecting the pericardium, partially or generally, to the surface of the heart, may remain much longer, or for years; and, in some cases, especially when these lesions are slight, without materially disturbing the health. These adhesions are frequently attended by increased redness of the membrane, and by a little turbid serum, unless when they have obliterated all remains of the cavity. Bertin, Elliotson, and Bouillaud believe that they do not occasion, even when general, any inconvenience beyond what proceeds from other coexistent lesions. But this is too favourable a view. They assist in developing, if they be not already associated with, still more serious alterations of the heart; and these latter frequently occasion other changes, either in collatitious or remote organs, more especially serous or sanguineous effusions; and thereby greatly abridge the period of existence.

137. viii. *The* Prognosis *of Inflammation of the Heart* ought to be given with caution, generally with reservations, even when the most favourable circumstances are present.—*A.* In *endocarditis* in its most severe states there is always more or less danger; and the danger becomes extreme when the anxiety is very great, when the pulse is very frequent and irregular, and when swoonings or cold perspirations supervene. The slighter or more *chronic states* of the disease might be amenable to treatment, if it were possible to ascertain their presence before they produce lesions which are but little under the control of medicine. But where these exist in a manifest degree, the prognosis becomes unfavourable in proportion as they oppose the circulation through the compartments of the heart; death being the ultimate result, although it may be long deferred, and various intermediate changes may occur.

138. *B. Pericarditis* is always a dangerous malady; yet a considerable proportion of the cases will recover if their nature be early recognised, and if an appropriate treatment be prescribed. M. Louis considers that perfect or partial recovery—partial, inasmuch as organic change of some kind remains, particularly adhesions of the pericardium to the heart—occurs in five cases out of six. If, however, the disease, whether acute, sub-acute, or chronic, has given rise to effusion, an unfavourable opinion ought to be entertained of it, and especially if the patient be far advanced in life, or of a cachectic habit of body. Whether the effusion be puriform, or sero-sanguineous, or pseudo-membranous, or serò-albuminous, the question is chiefly as to the length of time that may elapse before a fatal issue takes place; much depending upon the symptoms and signs indicative of the amount of effusion, upon the states of the pulse and of the respiration, and

upon the age and vital energies of the patient. When the effusion follows rapidly upon an acute attack, especially if there has been great frequency of pulse, and depressed constitutional powers, the danger becomes much more impending than when effusion takes place more slowly and to a less amount. If pericarditis be associated with endocarditis, as indicated by the bellows sound, or by any of its modifications, or with pleuritis, pleuro-pneumony, or diaphragmitis, the danger is thereby increased very greatly—and increased in proportion to the intensity or extent of these inflammations. When the sub-acute or chronic disease has given rise, at more advanced periods, to adhesions, or to false membranes (§ 107), the actions of the heart and diaphragm may be much disordered, and the functions of respiration, and of circulation in related or remote parts, greatly disturbed; but these consequences are not always observed. Patients have lived for years without much disorder being complained of; although more frequently these functions, particularly the latter, are more or less deranged, impeded circulation, or effusion into some cavity or organ, sooner or later taking place.

139. *C.* Of the prognosis of *true carditis* it is unnecessary to speak. If it be presumed to exist, the opinion of the result should be unfavourable, inasmuch as a degree of inflammation of the substance of the heart so intense as to be recognisable generally induces the most serious changes either on one of the surfaces, or in the structure of the organ. If the symptoms of *softening* of the heart (§ 125) be such as to admit of recognition, with any degree of confidence, the prognosis is extremely unfavourable, unless this lesion have taken place in fever, when a more favourable opinion may be entertained; recovery sometimes taking place during an energetic recourse to tonics, chalybeates, change of air, &c. The other consequences of carditis need not be noticed at this place, as they rarely admit of recognition during the life of the patient.

140. ix. Treatment of Inflammations of the Heart.—The different forms of carditis require very nearly the same means of cure, the chief modifications consisting in the extent to which vascular depletions should be carried in the various circumstances that usually present themselves, and in the choice of additional agents for averting the more serious changes which are apt to take place.—*A. Blood-letting* is necessary in the three varieties of carditis, and especially when either of them is associated with pleuritis, or pleuro-pneumony; but the utmost discrimination should be exercised as to its amount and repetitions. In all cases, it should be employed early in the disease, and the quantity of blood taken away ought to be in due relation to the violence of the attack, to the age and constitution of the patient, and to the effects produced. In general, vascular depletion may be carried farther in *pericarditis* than in internal carditis, and in the complicated, than in the simple disease. The practitioner ought not to be deterred from bleeding by the weakness and smallness, or irregularity of the pulse, or by the faintness complained of; nor induced to carry it too far by the palpitations and inordinate impulse of the heart, and by the cupped and buffed state of the blood. If carditis be connected with rheumatism, this state of the coagulum will continue, although depletion be carried to inanition. I have seen it greatest in the blood last taken, where I was confident that the depletion had been carried to a very dangerous length. In these cases, the disease is partly in the blood itself; there is a redundancy of fibrin and albumen, and an increased disposition to their coagulation.

141. *B. Internal carditis*, unless when associated with pericarditis, is not so much benefited by very large blood-lettings as may be supposed, although decided depletion, especially early in the disease, is required. M. Bouillaud thinks that this treatment should be carried farther in endocarditis than in pericarditis: but I differ from him in this; for the danger which he endeavours to avert by repeated venæsections—and by them chiefly, if not solely—may be more certainly and safely prevented by the means about to be noticed, when prescribed after more moderate or less frequent depletions than he recommends. Besides, internal carditis sometimes occurs in cases where blood-letting had been previously, and even copiously practised; as well as in others where it must be very cautiously and moderately resorted to. In all the forms of carditis, and particularly in pericarditis, it is often necessary to repeat the venæsection oftener than once; but as often, after one moderate or copious venæsection, cupping will be the best mode of abstracting blood. Indeed, a sufficient quantity may be taken away by this mode from the first, if the operation be properly performed. When the symptoms are severe, and the disease fully developed, the depletion should be prompt, copious, and *repeated*, according to circumstances; but care ought to be taken not to defer the repetition of it until the recurring inflammation proceeds far: the least indication of unsubdued action, or the earliest sign of a return of the disease, requires that this means should be again cautiously resorted to, aided, however, by the remedies about to be noticed. In the circumstances under consideration, nervous excitement, or irritation, may be mistaken for unsubdued inflammatory action. This may become a dangerous, if not a fatal error; and acute observation and enlightened experience can alone guard against it.

142. *C.* After blood-letting, the rapid induction of the *mercurial action* is of the greatest importance. With this intention, *calomel* should be given, every four or six hours, with *opium* and small doses of the *potassio-tartrate of antimony*, or James's powder, or with *colchicum* or *digitalis*. These medicines act beneficially, not only by abating the morbid action of the heart, but also by inducing more rapidly the specific effects of the mercury. In the rheumatic forms of carditis, colchicum is extremely useful. It may be prescribed either with calomel, or with saline medicines, especially the alkaline carbonates. I agree with Dr. Roots in his recommendation that patients should be kept long under the mercurial influence, and that a local depletion should be resorted to whenever the symptoms become aggravated. When palpitations or nervous symptoms follow depletions and the production of the mercurial action, *camphor* (F. 373, 375, 555), or *asafœtida* (F. 905), or the decoction of *senega* (F. 74), in moderate do-

ses, will be found extremely useful in reducing the irregularity and the frequency of the heart's action. If the irritability of the heart still continue, these medicines may be given with *digitalis* (F. 574), or with *hyoscyamus* (F. 460), or with *opium* (F. 493), or with the *hydrochlorate* or acetate of morphia (F. 537), or with the *hydrocyanic acid*. This last has been strongly recommended by Dr. Elliotson in such cases; and I have found it extremely useful. The extract or tincture of *hop*, either alone or conjoined with camphor, or with asafœtida, or with the compound galbanum pill, will also be found of service. Where it is still necessary to keep up the mercurial influence, the blue pill may be added to either of these. Anodyne *plasters* (F. 108, 117) may also be applied over the sternum: those containing camphor and extract of *belladonna* (F. 112, 113) will be found most beneficial. Anodyne *liniments* (F. 297, 313) will likewise be useful, particularly when pain or irritability continues after the mercurial action is induced.

143. *D.* In the more *chronic* or *sub-acute* states of inflammation of either of the constituent tissues of the heart, the means already recommended should be prescribed according to the severity and peculiarities of the case. If effusion have taken place into the pericardium, or if excrescences or other alterations about the valves or orifices be presumed to exist, external derivatives, by *blisters*, repeated or kept open; by *moxas*, *setons*, or *issues*; by the tartarized *antimonial ointment*, or by *croton oil*, may be tried. These derivatives are most serviceable when directed to a part at a little distance from the region of the heart. The præcordia will thus remain free for the application of either of the plasters, or of the liniments recommended above (§ 142), or of mercurial ointment with camphor. When, in these states of carditis, the action of the heart becomes inordinate, M. Bouillaud and some French physicians advise eight or ten grains of powdered digitalis to be sprinkled over the blistered surface. I have had no experience of this mode of employing digitalis. When, in addition to the irregular and excited action, there is more or less pain—a perverted state of sensibility following the morbid vascular action—ointments or embrocations containing the *narcotic alkaloids*, especially *veratria*, *delphinæa*, or *aconitine*, may be then tried, in the manner advised by Dr. Turnbull. I have prescribed the first of these substances in two or three cases of this kind; but, although it was not devoid of a certain degree of efficacy, it was not so beneficial as was anticipated from the praises bestowed upon it. In neuralgic affection of the heart, and in angina pectoris, the external use of these substances is sometimes productive of relief.*

144. *E.* When the inflammatory affections of the heart are *connected with arthritic or acute rheumatism*—in these especially, but also in other cases of carditis—a superabundance of fibrin or of albumen in the blood should be expected, and the disposition to its coagulation on the inflamed surface ought to be prevented as much as possible. The only means which I know capable of fulfilling this intention are, mercurials, combined as above advised, particularly with colchicum or antimony; the spirits of turpentine, given in drachm doses three times a day, until the kidneys become affected; the biborate or the carbonate of soda or of the other alkalies; and the iodide of potassium. These, after vascular depletion has been employed sufficiently, will often be of service, especially if they be judiciously combined with sedatives or narcotics, and aided by external derivatives; substances of an acid nature being, at the same time, avoided. Blood-letting will rarely, of itself, remove altogether this or any other form of carditis, or change the morbid state of the blood, unless it be assisted by other means, more especially by those already mentioned.

145. *F.* When either of the forms of carditis supervenes in the course of *eruptive* or *continued fevers*, after having a cautious recourse to general or local depletion, the milder preparations of mercury in frequent doses, until the mouth becomes affected, the alkaline carbonates, spirits of turpentine internally, or externally in the form of stupe or embrocation, mercurial liniments or ointments with camphor, &c., and external derivatives, are most to be depended upon. The action of the kidneys should also be promoted by conjoining these with anodynes, nitre, or the sweet spirits of nitre, digitalis, camphor, opium, &c., according to the peculiarities of the case; or by assiduously rubbing a stimulating *liniment* (F. 297, 311) over the loins. If the inflammation affect chiefly the internal membranes of the heart in the course of exanthematous or low fevers, or if it seem to have been induced by morbid or irritating matters in the circulation, vascular depletions must be employed with caution; in the latter of these circumstances they will often be more injurious than beneficial. The other means, however, just recommended, particularly camphor, nitre, the alkaline carbonates, and opium, should not be neglected.

146. *G. Relapses* of carditis, especially of pericarditis, are very common, particularly when the patient relinquishes medical and moral treatment before the morbid condition is entirely removed and the functions of the organ entirely restored, or when the inflammation has left more or less alteration of structure, or when the mercurial influence has been imperfect, of too short duration, or suddenly terminated. This influence should therefore be exerted fully, continued for some time—not less than two or three weeks—and allowed gradually to subside. In cases of relapse, the large depletions, often required in a first attack, are frequently hazardous. Local bleedings and a moderate use of mercury are generally sufficient. Relapses are usually of a sub-acute or chronic form, and are often merely exacerbations of unsubdued disorder, or inflammatory

* Dr. Turnbull prescribes *veratria* and *delphinea* in similar formulæ and in the same doses. He directs half a drachm of the alkaloid to be dissolved in a drachm of sweet oil, and made into an *ointment* with an ounce of prepared lard; or a scruple of the alkaloid to be dissolved in two ounces of rectified spirit, for an *embrocation*; or one grain in twelve pills, with extract of hyoscyamus, &c., one of which is to be taken every three hours. A small portion of the ointment, or of the embrocation, is to be rubbed over the præcordia, for ten or fifteen minutes, twice a day. He prescribes *aconitine* in similar formulæ to the foregoing; but he directs only sixteen grains, and eight grains of it to the same quantity of ointment and spirit respectively. Of the tincture of aconite (prepared from one pound of coarsely powdered aconite root macerated in two pounds of rectified spirit for seven days), he gives four or five drops three times a day, and employs it also externally.

action superinduced in parts already altered in structure as well as impaired in function. Hence these remedies should be prescribed with more precaution and restriction than in first attacks.

147. External derivatives, employed so as to produce a permanent effect, are usually of service in relapses, as in the chronic states of the disease. Blisters should be repeated, or kept open; but they should not be applied immediately over or too near the heart, nor longer than to produce redness or incipient vesication. The part ought then to be covered by a warm bread-and-water poultice, which ought to be several times renewed. The irritating effects produced on the circulation by the absorption of the cantharides will thus be in some measure prevented. Other means of derivation are often preferable to blisters, especially tartarized antimonial ointments or plasters; or warm turpentine stupes, embrocations, or liniments; but the former of these, as well as setons and issues, should be directed at some distance from the inflamed organ. If these occasion constitutional irritation or debility, they should be relinquished; or anodynes may be given, with gentle tonics, as the tincture or extract of hop, with camphor or asafœtida, or the medicines of this kind already advised (§ 142), may be prescribed, in combinations according to circumstances. The diet should be light, and moderately nutritious.

148. *H.* In the different states of carditis, the bowels must be kept moderately open by *mild* and *cooling purgatives*, but severe purging ought to be avoided. The functions of the other excreting organs should also be promoted. The urine especially ought to receive attention, both as to quantity and quality. If it abound with acid, as generally observed in the rheumatic complications, the alkalies, or the biborate of soda, may be given in large doses, with colchicum, camphor, digitalis, or hyoscyamus, &c. The states of the stomach and liver require careful regulation; and the redundancy of excrementitious matters in the blood must be prevented by promoting the free action of all the emunctories.

149. *I.* The *diet* and *regimen* should be strictly antiphlogistic in the more acute states of the disease. As these pass away, or lapse into more chronic forms, bland, mucilaginous, or farinaceous articles of food, according to the circumstances of the case, may be allowed; but even these ought to be given sparingly until convalescence is established. In the more chronic cases, or after relapses, the diet may be more nutritious, light animal food and broths being allowed in moderate quantity. Still, the principal part of the diet ought to be chiefly farinaceous; and all exciting or heating beverages must be avoided. During the different forms and complications of carditis, perfect repose, mental and physical, ought to be preserved. The patient's *drink*, in acute or first attacks especially, should be emollient and cooling. A weak decoction of marsh mallows, or of barley, or of liquorice root, or mucilaginous fluids containing small quantities of the nitrate of potash, and the subcarbonate of soda, or the biborate of soda, will be found generally appropriate. Beverages containing an acid should be avoided.

[Great obscurity has hitherto rested upon the pathology of cardiac affections, and especially upon the causes through which, in acute rheumatism, disease is set up in the heart. Animal chemistry, in the hands of Andral, Liebig, Golding Bird, Bence Jones, and others, has at length shed some light upon these diseases, and furnished a clew, which, if faithfully followed out, may lead to still more important and successful results. Neither an accurate description of symptoms (and none has been more accurate and true to nature than that of Aretæus), nor pathological anatomy, served to aid us much either in the diagnosis or treatment of these obscure affections, until at length auscultation and percussion disclosed new diagnostic signs, and gave significance to those not previously understood or correctly interpreted. Then pathological chemistry came to our aid, and by its steady rays illuminated a path hitherto devious and shaded in twilight; so that at the present moment we stand in advance of our predecessors, and, if we mistake not, are destined to make still more important acquisitions in this field of discovery. We have already alluded (art. Blood) to the evidences of an acid diathesis in acute rheumatism, as manifested by the state of the secretions, especially the perspiration, caused by the retention of lithic acid in the blood,* from impaired function of the kidneys; thus causing the vital fluid to prove morbidly stimulant to the heart and arterial system, as well as the synovial tissues. But, besides this, we have, according to Andral, an increase of *fibrin* from 2·5 to 4 (in healthy blood), to 8 or 10 in 1000 parts, or more than triple its natural quantity; and these two morbid states of the blood undoubtedly tend to excite inflammatory action in the serous membrane lining and investing the heart. "The subversion of the alkaline state of the blood," says Dr. Furnivall, "could not but prove highly exciting to the endocardium, thus causing hypertrophy and inflammation; while the superabundance of the fibrin tends to favour the formation of deposites within the fine interstices of the cardiac valves and parts adjacent, leading to an embarrassment of their action, until the valves can no longer preserve their natural functions. Besides, we know that rheumatic inflammation generally attacks the fibrous and fibro-serous textures, and as these textures abound in and about the heart, we have thus another cause powerfully determining morbid action to this organ."

Dr. Furnivall states that, since 1830, he has employed alkalies, especially the *liquor*, or *carbonas potassæ*, very extensively in acute rheumatism, and that during that period not a single case of heart disease has occurred in his practice complicating the former affection, al-

* [It has been objected to this hypothesis that the blood is an electro-negative body, and will not allow free acid in its composition. But it is not necessary that the acid should be a free acid: on the contrary, it may exist under some other form, or only its elements may abound in the blood in greater proportion. Dr. Simon has recently discovered lithic or uric acid in purulent secretion; and it has frequently been recognised in the fluid of rheumatic ulcerations; and the saliva, it is well known, has an acid reaction. The time is not distant when chemical analysis will be so far perfected as to detect these minute changes in the composition of the blood; a process of exceeding difficulty, owing to the chemical transformations that occur at the time the analysis is going on.]

though more than fifty cases have come under treatment, without including any cases of chronic or sub-acute rheumatism.* Dr. F. supposes that alkalies act in these cases in a fourfold way: 1st. As neutralizers of the acid predominant in the system, and as restorers of the alkaline condition of the blood; 2d. That they serve to dilute the fibrin superabounding in the blood, and thus restore its normal fluidity; 3d. As sedatives, indirectly, by the first two modes of action; and, 4th. As diuretics, thus helping to carry off the morbid elements of the blood.

We have been in the habit of prescribing alkalies in rheumatism for nearly twenty years, and with constantly increasing evidence of their prophylactic efficacy in preventing inflammation fastening upon the heart, or its investing or lining membrane. Indeed, there is no class of medicines which produces more decided effects upon the blood than alkalies, and none which can be depended upon with more certainty, either to dilute or thin the fibrin of the blood, or reduce the plethora which attends on hypertrophy. We frequently find this condition resisting the use of the lancet, which, indeed, is but comparatively transitory in its effects, the very loss of blood often seeming to induce a more active formation of it, besides the injurious reaction which so frequently follows. But by the use of the *hydrochlorate of ammonia*, *liquor potassæ*, the *nitras potassæ*, and the *alkaline subcarbonates*, we may in a short time reduce the amount of red globules, and obviate that condition of the vital fluid on which plastic inflammation depends.

We cannot, in this connexion, avoid entering our protest against the use of an article which is frequently employed in acute cardiac affections for the purpose of moderating the action of the heart; we mean *digitalis*. This agent not only excites a very considerable degree of nausea and gastric irritation, which, by-the-way, always prevent any sedative or diuretic effect, but it manifestly enfeebles the action of the heart and retards the circulation of the blood, consequently promoting its stagnation; a state of things which it is highly desirable to avoid. In all cases of heart affections, attended with much debility of the organ, there is greater or less danger of polypous formations, and in acute endocarditis there is, as we have seen, great liability to vegetations of lymph becoming attached to the valves and lining membrane of the different cavities, an accident which digitalis is likely to favour. Although there may not be in endocarditis any positive debility of the cardiac muscular fibres, there nevertheless is, after a few days at least, a laboured action of the organ, showing an inability to propel the thickened blood. In these cases, alkalies, with aconite or hydrocyanic acid, are far preferable, and by their combined use we may avoid the necessity of excessive bloodlettings. Dr. Furnivall recommends *aconite*, indeed, as one of the most important remedies in the treatment of endocarditis, especially as a sedative, which he regards as superior to any other. It appears to possess a decided action on the organic nerves; reduces the action of the heart speedily and in a very sensible degree; possesses considerable power as an antiphlogistic, and is neither apt to excite nausea, nor does it prove dangerously cumulative, like digitalis. In all cases, then, of cardiac affection in debilitated subjects, where there is great excitement of the circulation, aconite is well worthy of trial. We often meet with these cases of heart disease where there is considerable excitement, with inflammatory tendency, combined with a general want of power, and where we are afraid to use the lancet. Here we are disposed to believe that the aconite will prove a valuable remedy, as it has frequently been known to reduce the pulsations, in 48 hours, 20 or more in a minute. It is a remedy, moreover, well adapted to hypertrophy; to inflammatory complications; and especially to prevent palpitations as well as to remove them, inducing, as it does, a permanent diminution of the heart's action and of its irritability, whether the habit be debilitated or not; neither lowering the strength nor causing nausea, yet effectually quelling inordinate action. The antiphlogistic action of this article is fully proved by the fact that it speedily removes that condition of the blood on which its buffy coat depends. To ensure its activity, great care is, however, necessary, not only in its preparation, but also in preserving it from the action of heat, light, and atmospheric air.

The *extract of asparagus* has recently been recommended by Mr. Furnivall and others as an important remedy in the treatment of these affections; reducing the number of pulsations from 120 to 90 in about 30 hours. We have known it employed with apparent benefit in these cases, and deem it well worthy of farther trials.

General and acute pericarditis is, at the same time, one of the most dangerous as well as the most difficult to treat of all diseases, its danger arising from the vital importance of the organ affected, and its liability to organic changes before adequate remedial measures are entered upon. Patients, it is true, generally *apparently* recover from pericarditis and endocarditis, but if we examine them carefully afterward, we shall, in a large number of cases, discover a distinct bellows sound, or other evidence of some organic change, which alters the healthy proportion of the cavities and their outlets, or which interferes with the natural play of the heart. Time reveals the mischief that has been done, and when the patient dies, we find disease of the valves, hypertrophy, dilatation, or an adherent pericardium, life having been a tedious scene of protracted suffering.

Dr. Copland, as well as Dr. Hope, differ from Bouillaud in the extent to which they would carry blood-letting in these affections, especially in acute pericarditis. Dr. Watson tells us that Bouillaud's practice has failed in Great Britain; that although early and copious bleeding may arrest the disease before the sound of attrition is heard, yet that *afterward* the consequences of inflammation will be unaffected by this remedy. There is undoubtedly much risk in bleeding to syncope in this disease, as in rheumatic cases, at least, endocarditis is generally present, and there is a tendency towards a deposition of the fibrin of

* ["The Diagnosis, Prevention, and Treatment of Diseases of the Heart and of Aneurism, with Observations on Rheumatism," by J. J. Furnivall, M.D., Lond., 1845.]

the blood, in the shape of minute vegetations, upon the inflamed valves, which is favoured by a retarded movement of the blood over them, and particularly by its stagnation, as in fainting.

Bleeding should, therefore, not be carried to such an extent as to endanger such a result, but it should be free, and repeated according to circumstances. Cups and leeches to the præcordial region will, in general, if carried to a sufficient extent, be found preferable to general blood-letting. Too much importance can scarcely be attached to the use of mercury in this affection; and we are always to bear in mind the remark of Dr. Latham, that "in acute pericarditis there is no medium between complete cure and certain death."

Our treatment in these cases has been similar to that recommended by Hope. The patient is bled in an erect position, and from a large incision, to the verge of syncope; and the earlier the better. From thirty to fifty leeches are then applied immediately, or as soon as reaction appears, over the præcordial region; and if the pain is not entirely relieved by these means, together with cathartics, a stimulating enema, and strong revulsives to the extremities, we repeat the bleeding, or the leeching, or both, as the case may require, and this two, three, or more times, according to the circumstances of the patient. Such active treatment as this, however, we have rarely found necessary. During a dispensary practice of over four years, in which time several thousand patients with various diseases came under our treatment, we recollect only some ten or twelve cases of pericarditis that required very active treatment. In a large number of instances the disease was promptly arrested by one very copious blood-letting, followed by free leeching, and an active cathartic. In the aged, the debilitated, or the very young, cupping was found preferable, both to general bleeding and to leeching; and this is the proper remedy where, from persistance of pain and other symptoms, the disease appears to have been not thoroughly eradicated, and yet the condition of the patient scarcely seems to warrant the farther abstraction of blood. Dr. Hope thinks that where mercury is employed to such an extent in the early stage of the disease as to produce its constitutional effects, the total quantity of blood necessary to be lost will rarely be considerable. But the difficulty is to affect the system with mercury sufficiently early to prevent the necessity of sanguineous depletion.

We are to bear in mind that our object is to prostrate the action of the heart in an expeditious manner, and prevent the establishment of reaction. Our experience coincides with that of Dr. Hope, that if this object can be accomplished after the first 20, 30, or 40 hours, the disease frequently does not rally, but remains perfectly under the control of remedies. And we also agree with him in the opinion that a degree of activity in the first instance, which to some may appear excessive, is an ultimate source of economy to the strength of the patient, as the disease is subdued at once, and the protracted continuance of depletory measures, the most exhausting to the constitution, is rendered unnecessary. In addition to these measures, diluting, cooling drinks of the super-tartrate of potash (℈iv. to one quart of water), or of nitrate of potash (℈ij. to one quart) should be drank freely, and nauseating doses of antimony administered every two or three hours, the diet consisting of barley or rice water, gruel, or thin arrow-root. The administration of mercurials should commence at an early period of the disease, and, in most cases, carried to a sufficient extent to produce a tender state of the gums, which should be maintained for a week or ten days, or even longer, unless the symptoms yield before the expiration of this period. A succession of small blisters over the præcordial region will prove highly useful, where pain continues in the advanced stages of the malady, and also where effusion has taken place into the pericardial sac, as already mentioned.

The practitioner should ever bear in mind the importance of closely watching the cardiac symptoms in all cases of acute rheumatism, that he may be able to discover and to check the very first invasion of disease in this most vital organ. Auscultation should be practised, if possible, several times in the 24 hours, for often, where there is no pain, no excess of impulse, no irregular action, some unusual sound may be detected in the heart, showing that something wrong is going on there. It may be a simple prolongation or harshness of the systolic sound, without any distinct bellows murmur; and those accustomed to diagnosticate cardial affections will be able to discover these minute and, to many, inappreciable changes, before they have gone to that extent as to be obvious to the uncultivated ear. Where the central organ of the circulation is suddenly invaded with inflammatory action, we generally find pain in the præcordial region, with irregular or fluttering action of the heart; but in many instances the approaches of disease are so insidious that no objective symptoms are presented, and we must trust to the delicate and feeble impressions made upon our organs of hearing. We agree with Dr. Latham, that where any endocardial or exocardial murmur is heard in acute rheumatism, we shall be justified in resorting at once to blood-letting and other antiphlogistic measures, and that we should do wrong in waiting until a distinct bellows murmur is heard. In these cases, not only the ear, but the eye, and every sense and faculty are to be employed in ascertaining what is going on within.

With respect to the extent to which mercury should be employed in acute diseases of this kind, our rule is to give it in such a way as speedily to produce its constitutional effects, without, however, inducing salivation; and this may often be done in 48 hours, if combined with such a proportion of opium as to prevent its escape by the bowels. Experience has abundantly proved that we have no remedy, except blood-letting, which so effectually controls inflammatory action as this mineral; it must, however, be employed conjointly with other means, as so ably pointed out by Mr. Copland in various parts of this work.]

150. x. Of Inflammations of the Heart in Children.—*A. Internal Carditis* is sometimes met with in *children*, most frequently after smallpox, scarlatina, pneumonia, hooping-cough, and measles; but it occasionally, also,

appears as a primary affection. It is often connected with articular rheumatism, or complicated with pneumonia or pertussis. I have observed it to attend, in its more acute states, the secondary fever of smallpox, but it more commonly appears during convalescence from these eruptive diseases. It is generally insidious in its attack and early progress. The pulse becomes quick, irritable, small, and irregular. Cough, without expectoration, or increase of pain, is sometimes present. The sounds of the heart are extended, and the pulsations are indistinct or tumultuous, or run into one another. Breathing is short or hurried, especially on any exertion. A heavy pain or aching, or soreness is felt under the sternum, and to the left side. The jugular veins often pulsate; the face is anxious; the hands become hot in the evening, and the child cannot preserve the horizontal posture in bed. Still it walks about, appears only much out of health, is short-breathed, irritable, and very delicate. On auscultation, a blowing or bellows sound is generally heard more or less distinctly. At last hypertrophy, with dilatation of the heart, becomes manifest, and all its consequences.

151. *B. Pericarditis* is a much more common disease in children than is generally supposed. I have met with it often, both in its simple and complicated forms, and at all the epochs of childhood, from three or four years and upward. It is frequently associated with endocarditis and true carditis, and with pleuritis or pleuro-pneumony. In the latter complications it often proceeds to a fatal issue, without having been recognised during life, it having been masked with the pulmonary affection. Most commonly, however, it is connected with acute arthritic rheumatism; and in this case there may exist also internal carditis, and diaphragmatic or pulmonary pleuritis.

152. *C.* The *Causes* of pericarditis in children are nearly the same as in adults. I have observed the disease chiefly in children who live in low cellars, and in ground floors, and are much exposed to cold and humidity, especially if they be imperfectly clothed and ill-fed. It is from these causes principally that articular rheumatism, with which the different forms of carditis are generally associated in children, also arises. Pericarditis is often occasioned by exanthematous fevers, and by inflammations of the lungs or pleura; or it follows these diseases, most probably, in consequence of exposure to cold, or to vicissitudes of temperature during convalescence from them. It is extremely rare to meet with articular rheumatism in persons under puberty, and especially in children, unconnected with external or internal carditis, or even with both. The *Symptoms* of pericarditis in children, and the structural lesions produced by it, as well as those consequent upon endocarditis, differ in no respect from the history given of them in adults.

153. *D.* The *Treatment* of inflammation of the heart in children should be strictly and actively antiphlogistic at an early stage. Decided local depletions, the exhibition of calomel or other mercurials with colchicum, or antimonials, or other anodynes; mild purgatives, external derivatives, perfect repose, and a bland, low diet, with the emollient and alkaline drinks already prescribed, are the chief means of cure.*

Bibliog. and Refer.—i. Carditis.—*Rondelet*, Method. Curand. Morb., cap. x., p. 135. Lugd. Bat., 1575.—*N. Andry*, Remarques sur la Saignée, la Purgation, &c., 12mo. Paris, 1700.—*A. Pasta*, Epist. de Cordis Polypo in Dubium Revocato. Berg., 1739.—*Gloger*, De Infiam. Cordis Vera., 8vo. Jenæ, 1758.—*J. Pasta*, De Sang. et Sang. Concretionibus per Anat. indagatis, &c. Berg., 1786.—*Borsieri*, Instit. Med. Pract., t. iv., § 254–279.—*F. L. Bang*, Selecta Diarii, &c. Annis 1783, 1785, et 1786, *passim*.—*A. Portal*, Cours d'Anat. Med., t. iii., p. 79.—*Marcus*, Entwurf einer Speciellen Thérapie, b. ii., p. 235.—*Kriegelstein*, in *Hufeland's* Journ. der Pract. Heilk., b. xix., st. iv., p. 119.—*Schenck*, in Ibid., b. xxvii., st. i., p. 66.—*Gærtner*, De Polypo Cordis in Specie Infant. Würsb., 1811.—*Merat*, Dict. des Sciences Méd., t. iv., p. 74.—*J. F. Davis*, Inquiry into the Symptoms and Treatment of Carditis, &c., 8vo. Bath, 1808.—*Huber*, De Carditide quæ epidemice grassata est inter Milites. An. 1814, in Obsid. Cast. Delfzyl. Grön., 1819.—*E. Stanley*, Trans. of Med. and Chirurg. Soc. of Lond., vol. vii., p. 319.—*James*, in Ibid., vol. viii., p. 434.—*Folchi*, Riflessioni sulla Diagnosi della Carditide a Pericarditide, 8vo. Romæ, 1829.—*F. L. Roux*, De Carditide Exudatione; cum Tab., 4to. Leipz., 1820.—*Author*, in Lond. Med. Repos., vol. xv., p. 25, 1821.—*J. F. Meckel*, Fab. Anat. Path. Fasc., i. Leips., 1817.—*Laennec*, De l'Auscultat. Mediate, ou Traité du Diagnostic des Mal. des Poumons et du Cœur, t. ii. Paris, 1819, 2d ed., 1826.—*Glas*, Ueber Herzbeutzünd., 8vo. Würzb., 1826.—*Hildenbrand*, Institut. Med. Pract., vol. iii., § 571.—*Broussais*, Examen des Doctrines Médicales Gén. adopt., &c., 2d ed., t. iv., p. 203.—*T. Puchelt*, De Carditide Infantum, &c., 8vo. Leipz., 1824.—*Recamier*, in Revue Mediçale, t. iv., 1824, p. 336.—*Heim*, in *Rust's* Magaz. f. d. Gesammte Heilk., b. vi., hft. 3, p. 343; et in Journ. des Prog. des Scien. Méd., t. xv., p. 227.—*A. H. Krause*, De Carditide Idiopathica Acuta. Berl., 1826; et in Ibid., t. xv., p. 229; et in Archives Gén. de Méd., 2d ser., t. v., p. 459.—*J. B. G. Barbier*, Precis de Nosologie et de Thérapeutique, 8vo. Paris, 1828, t. ii., p. 553–594.—*Gairdner*, in Trans. of Med. and Chirarg. Soc. of Edin., vol. ii., p. 237.—*P. M. Latham*, Lond. Med. Gaz., vol. iii., p. 118.—*M. E. A. Naumann*, Handb. d. Medicin. Klinik., b. ii., p. 104.—*Watson*, in Lond. Med. Gazette, vol. xvi., p. 56, 61, 164, 1835.—*B. V. Casaneuve*, Mém. sur l'Endocardite Aigue, in Gazette Méd. de Paris, 25th June, 1836. (See, also, the Bibliog. and Refer. to the other chapters.)

ii. Pericarditis.—*Zacutus Lusitanus*, Med. Pr. Hist., t. i., l. iv., n. 41; et Prax. Admir., l. ii., obs. 138.—*Salius Diversus*, De Affect. Particul., cap. vi.—*Bonet*, Sepulchretum, l. ii., s. xi., obs. 16; s. x., obs. 10, 18.—*Riolanus*, Enchirid. Anat. Pathol., l. iii., c. 4.—*Boerhaave*, in Sammlung Auzerles. Abhandl. Prakt. Aerzte, b. ix., p. 495, *et seq.*—*Morgagni*, De Caus. et Sed. Morb., Ep. xxii., 10; Ep. xxx., 7; Ep. xxiv., 2, *et passim*.—*Pohl*, Prog. de Pericardio Cordi adhærente ejusque Motum turbante. Leipz., 1775.—*Nobel*, De Pericardio cum Corde Concreto. Giess., 1778.—*Haller*, Element. Phys., vol. i., p. 295, et Add. ad Elementa Physiol., p. 128.—*D. Heen*, Rat. Med., t. xiv., p. 30.—*Van Døveren*, Spec. Observ. Acad., cap. i., p. 74.—*Sandifort* Op. cit., l. i., cap. ii., p. 43.—*A. Monro*, Prescript. of the

* On referring to my note-book for cases of pericarditis in children, I find that, in those from five to seven years of age, the following was the treatment most commonly prescribed. All these cases were connected with articular rheumatism. After cupping or applying leeches over the sternum, according to the age and strength of the child, a powder, consisting of three grains of calomel and one of James's powder, was directed to be taken three times a day, and continued till the gums were affected. This mixture was also prescribed, and the effects of both carefully observed:

No. 252. ℞ Mist. Camphoræ ℥iij.; Liq. Ammoniæ Acet. ʒj.; Vini Antimonii Potassio-Tart. ʒss.; Tinct. Sem. Colchici ℥lxxv.-xxx.; Sirupi Tolutani ʒj. M. Fiat Mist., cujus capiat Coch. ij. minima, tertiâ vel quartâ quâque horâ.

Blisters were generally directed to the right side of the chest, with the precautions above enforced (§ 147); and where there appeared a tendency to effusion into the pericardium, the following was sometimes directed:

No. 253. ℞ Mist. Camphoræ, Aq. Fœniculi, ää ℥jss.; Liq. Ammoniæ Acetatis ℥j.; Potassæ Acetatis ʒijss.; Spirit. Æther. Nit. ʒj.; Tinct. Digitalis ℥lxv.; Tinct. Scillæ ʒss. M. Fiat Mist., cujus capiat Coch. i., medium, quartis horis.

If the internal surface of the heart seemed to be inflamed, after the remedies already noticed, the following was often employed:

No. 254. Mist. Camphoræ ℥ivss.; Potassæ Nitratis ʒij.; Sodæ carbon. ʒj. (vel Sodæ bi-boratis ʒss.); Spirit. Ætheris Nit. ʒjss.; Tinct. Digitalis ℥lxx.-xxx.; Sirupi Papaveris ʒj. M. Fiat Mist., cujus capiat Coch. ij., minima, vel j medium quater in die.

Buræ Mucosæ, &c., p. 41.—*Senac*, De Corde, l. iv., c. 2.—*Stoerck*, Ann. Med., vol. ii., p. 232, 264.—*Stoll*, Rat. Med., pars ii., p. 385.—*Watson*, Phil. Trans., 1777, at 31.—*Lieutaud*, Hist. Anat. Med., l. ii., obs. 672, *et seq*.—*J. G. Walter*, in Nouv. Mém. de l'Acad. des Sciences à Berlin, 1785, t. iv., p. 57; Observ. Anat., p. 63; et Mus. Anat., vol. i., p. 148-297.—*Caldani*, Mem. di Fisica della Soc. Ital. à Modena, t. xii., p. 2.—*J. P. Frank*, De Cur. Hom. Morb., l. ii., p. 173.—*Biermayer*, Mus. Anat. Pathol., No. 434.—*Portal*, Mém. sur. Plusieurs Malad., t. iv., p. i.; et Cours d'Anat. Méd., t. iii., p. 24.—*Prost*, Méd. éclairée par l'Ouverture des Corps, vol. i., p. 140.—*Andral*, Mém. de la Soc. Méd. d'Emulation, t. ix., p. 380.—*Tacheron*, Recherches Anat. Path., t. iii., p. 226. Paris, 1825.—*J. Abercrombie*, Trans. of Med. Chirurg. Soc. of Edin., vol. i.—*J. Frank*, Rat. Institt. Clin. Ticin., cap. ix., et Prax. Med. Univers. Præcepta, par. ii., vol. ii., sect. ii., p. 120, *et seq*.—*Müller*, De Concret. Morb. Cordis cum Pericard. Casibus aliquot illustrata, 8vo. Bon., 1825.—*Rayer*, in Archiv. Génér. de Méd., t. i., p. 521.—*Toulmouche*, in Ibid., t. xviii., p. 503.—*Louis*, in Revue Med., t. i., p. 30, 1826; et Mém. et Recherches sur l'Anat. Path., 8vo. Paris, 1826, p. 253.—*J. P. Latham*, Lond. Med. Gaz., vol. iii., p. 209.—*Adams*, Dub. Hosp. Rep., vol. iv., art. 19.—*Bleuland*, Icones Anat. Pathol., 4to. Tab., 1, 2. Traj. ad Rh., 1826.—*Brissault*, Essai sur la Pericardite, consid. dans son Etat Aigu et Chr., 8vo. Strasb., 1826.—*Stiebel*, Monog. Cardit. et Pericardit. Acutæ, &c., 4to. Franc. ad Mœn., 1828.—*R. Mayne*, in Dublin Journ. of Med. Science, vol. vii., p. 255.—*Seidlitz*, in *Hecker's* Annalen., b. ii., Heft. 2. Berl., 1835.—*Hughes*, in Guy's Hosp. Reports, No. 1, p. 175.—*Stroud*, in *Johnson's* Med. Chirurg. Rev., No. 46, p. 441.—*J. Watson*, Med. Gaz., July 30, 1836, p. 701.—*Roots*, St. Thomas's Hosp. Reports, No. 4, June, 1836; and Med. Gaz., Nov. 12, 1836, p. 222.—*R. W. Smith*, in Dublin Journ. of Med. Science, vol. ix., p. 418. (See, also, Bibliog. and Refer. to Diseases of the Heart generally.)

iii. Ulceration, Suppuration, Softening, Partial Aneurism, and Gangrene of the Heart.—*Benivenius*, Observ., cap. 42.—*Schenck*, Observ., &c., l. ii., obs. 202-207.—*Columbus*, De Re Anat., l. xv., p. 489.—*Bonet*, Sepulchret., l. iv., sect. i., obs. 2; sect. x., obs. 1.—*Morand*, in Mém. de l'Acad. des Sc. de Paris, 1732, p. 594.—*G. Galeati*, De Bonon. Scien. et Art. Instituto atque Acad. Comment., t. iv., p. 26, 1757.—*Morgagni*, Epist. xxv., 17-25; Ep. xvii., 5, 8.—*Stoerck*, Ann. Med., vol. ii., p. 262.—*Lieutaud*, Op. cit., vol. ii., obs. 510-543.—*M. Akenside*, in Philos. Trans., vol. liii., p. 353.—*Cruikshanks*, The Anat. of the Absorb. Vessels, &c. Lond., 1786.—*Sandifort*, Observ. Anat. Path., l. iv., sect. x., p. 109.—*Penada*, Saggi di Padova, t. iii., par. ii., p. 59.—*Walter*, Nouv. Mém. de l'Acad. des Scien. à Berlin, 1785.—*Vering*, in Den Abhandl. der Josephsakad., vol. ii., p. 345.—*Johnstone*, Mem. of Med. Soc. of Lond., vol. i., and in Med. Essays. Evesham, 1795.—*Dessult*, Cours de Clinique Externe, p. 117. Paris, 1804.—*M. Baillie*, Morbid Anat., &c., ed. 5th, p. 5.—*Corvisart*, Op. cit., obs. 42, et p. 253.—*Biermayer*, Mus. Anat. Path., No. 374.—*Portal*, Op. cit., t. iii., p. 79, *et passim*; et Mém. sur Plusieurs Malad., t. iv., p. 17-62.—*Testa*, Op. cit., p. 233-245.—*Gauley*, Mém. sur la Gangrene du Cœur, 8vo. Paris, 1807.—*Bagata*, in *Brera's* Giorn. di Med. Practica, t. iii., par. ix.—*G. Jager*, in *Harles's* Rhein. Jahrb., b. ii., p. 146.—*Josephi*, Neuen Archiv. für Aerzte, b. iii., n. 4.—*Fitzpatrick*, in Lond. Med. Repos., vol. xvii., p. 295.—*Author*, in Ibid., vol. xvii., p. 298.—*Laennec*, Op. cit., t. ii., p. 286, 305.—*H. Cloquet*, Bullet. de la Faculté de Méd. de Paris, 1822, p. 219.—*J. Kennedy*, in Lond. Med. Repos., vol. xxi., p. 124.—*Scoutetten*, in Journ. Universelle des Scien. Med., t. xxiii., p. 236.—*Maruejouls*, Journ. du Progrès des Sc. Méd., &c., t. xvii., p. 253.—*Rullier* et *Andral*, in Revue Médicale, t. ii., 1824, p. 306.—*Kreysig*, Op. cit., b. iii., p. 165.—*Newbert*, in *Hufeland's* Journ., &c., Nov., 1823, p. 91.—*Berard*, Diss. sur quelques Points d'Anat. Path. et de Path. Paris, 1826; et Archives Gén. de Méd., t. x., p. 264.—*Biett*, in Ibid., t. xiii., p. 110; et Répert. Gén. d'Anat. et de Physiol., 1st Trim., 4to, 1827 (*The case of Talma*).—*R. Adams*, in Dublin Hospital Reports, vol. iv., p. 353.—*Breschet*, in Rép. Gén. d'Anat. et de Phys., &c., t. iii., p. 183.—*Reynaud*, Journ. Hebd. de Méd., t. ii., p. 363.—*Maréchal*, in Ibid., t. ii., p. 494.—*Bignardi*, Annali Universali di Med., Jan., 1829; et Arch. Gén. de Méd., t. xix., p. 438.—*Dezeimeris*, in Ibid., t. xxi., p. 343.—*Ollivier*, in Dict. de Méd., 2d ed., art. *Cœur*.—*Andral*, Anat. Path., t. ii., p. 324. (See, also, *Ploucquet's* Med. Digesta, art. *Cordis Apostema, Arrosio, Exulceratio*, and *Ulcus*, and the References to the other chapters.)

iv. Induration, Ossification, &c.—*Hollerius*, De Morbis Internis, l. i., cap. 50.—*Vesalingius*, Observ. Anat. et Epist. Med., xv.—*Bartholinus*, Hist. Anat., cent. i., 50; cent. ii., 45.—*Gemma*, in *Haller's* Biblioth. Med. Pract., vol. ii., p. 198.—*Garengeot*, in Mém. de l'Acad. des Sciences, 1736.—*Boerhaave*, Prælect. ad Institt., § 478 (*The septum ossified*).—*Aurivillius*, Nova Acta Soc. Upsal., vol. i., n. 15.—*Albertini*, in Comment. Bonon., vol. i., 1731.—*Morgagni*, De Sed. et Caus. Morb., Ep. xxvii., art. 17, *et seq*.; et Ep. xxviii., 16.—*Senac*, Op. cit., c. 5.—*Guest*, in Lond. Med. Mus., vol. iii., p. 165.—*Stoll*, Rat. Med., par. i., p. 252.—*De Haen*, Rat. Med., par. vi., c. 4.—*Schaarschmidt*, Medic. und Chir. Nachrichten Jahrg., b. iii., p. 245.—*Lieutaud*, t. ii., obs. 556, 571.—*Simmons* and *Watson*, in Med. Communicat., vol. i., art 18, 19.—*Bordenave*, Mém. de l'Acad. des Scien., &c., 1786, p. 53.—*Beauchamp*, in *Sedillot's* Rec. Périod., t. v., p. 292.—*Haller*, Elem. Phys., vol. viii., par. ii., p. 78.—*Michaëlis*, Medicin. Pract. Biblioth., b. i., st. i.; et in *Hufeland's* Journ. der Pract. Heilk., b. xviii., st. iii., p. 6.—*Thomann*, Ann. Institut. Med. Clin. Wurceb., vol. i., p. 118.—*Reuss*, Repert. Comment., vol. x., p. 94.—*M. Baillie*, Series of Engravings, &c., Fasc. i., pl. 3.—*Renauldin*, in *Corvisart's* Journ de Med., vol. xi., p. 259.—*Crowfoot*, in Edin. Med. and Surg. Journ., vol. v., part xix.—*Ploucquet*, Med. Digesta, art. *Cor, Ossificatio ejus*.—*Prost*, Méd. éclairée par. l'Observat. et l'Ouvert. des Corps, t. i., p. 140.—*Weber*, in Salzb. Med. Chir. Zeitung, part ii., p. 80 (*Two bony plates as large as oyster shells*).—*A. Burns*, Op. cit., p. 146.—*Kreysig*, Op. cit., b. iii., p. 268.—*Laennec*, Op. cit., t. ii., p. 402.—*Cruveilhier*, Sur l'Anat. Pathol., t. ii., p. 22, 77.—*Rudolphi*, Grund. d. Physiol., b. ii., par. ii., p. 290.—*Boeck*, De Statu quodam Cordis Abnormi., 8vo. Ber., 1818, p. 25.—*Mayer*, Oesterreich. Med. Jahrb., b. v., par. iii., p. 80 (*Nearly the whole upper surface oss*.).—*A. W. Otto*, Selt. Beob., part i., p. 99, and Comp. of Hain. and Comp. Pathol. Anat., trans. by *South*, p. 286.—*Tacheron*, Recherches sur l'Anat. Path., t. iii., p. 257, 261.—Archives Gén. de Méd., t. i., p. 521.—*Bertin*, Traité des Mal. du Cœur, p. 262.—*Louis*, Mem. ou Rech. Anat. Path., p. 296.—*Abercrombie*, in Trans. of Med. Chirurg. Soc. of Ed., vol. i., p. 1.—*Adams*, in Dub. Hosp. Rep., vol. iv., art. 19.—*Rose*, in Lond. Med. Repos., vol. xix., p. 29, and in Med. and Phys. Journ., Dec., 1823.—*R. W. Smith*, in Dub. Journ. of Med. Sc., vol. ix., p. 418. (See, also, the Bibliog. and Refer. to the chapter on *Structural Lesions of the Heart*.)

V.—Of Structural Lesions of the Heart and Pericardium.

Classif.—IV. Class, II. Order (*Author* in *Preface*).

154. Defin.—*Alterations of one or more of the constituent tissues or compartments of the heart, generally arising from previous local or constitutional disease, and occasioning more or less obvious lesions of related organs.*

155. This class of disease of the heart might, according to the definition just given, have comprised several alterations of structure which have been already considered; but as these alterations more immediately proceed from inflammatory action, they have been noticed under the head of inflammations of this organ. The lesions, however, which remain to be described do not depend alone upon either of the chief pathological states already discussed. They are no more the consequences of inflammation than they are of altered nervous power. Indeed, they may even occur without any evidence of either morbid condition having existed, although they often more remotely result from certain combinations or forms of these conditions. The only inference that can be drawn from a minute examination of a large proportion of them is, that the organic nervous influence, and, consequently, that the states of vascular action and of the circulating fluids have been altered in such a manner as to have affected the nutrition of one or more of the constituent structures of the heart, or to have given rise to preternatural and adventitious productions in that organ. (See art. Disease, § 93, *et seq*.) In the consideration of the structural lesions of the heart, I shall notice, in the *first* place, those which seem to be the simplest in their nature, and in respect of the morbid conditions out of which they arise; and subsequently those which depend upon more complicated pathological states.

i. Hypertrophy of the Heart.—*Increase of the Muscular Tissue of the Heart.*

156. Defin.—*Augmentation of the muscular*

substance of the organ, resulting from increased nutrition, and this from excited action.

157. *A. Description.* — Although DIEMERBROECK, BARTHOLIN, LANCISI, MORGAGNI, SENAC, BORSIERI, CORVISART, and others had described, more or less fully, hypertrophy *with* dilatation, and had even noticed the simple form of hypertrophy, or that *without* dilatation, yet it was not until 1811 that the different varieties of the lesion under consideration were fully investigated. In that year M. BERTIN described the several forms of hypertrophy with an accuracy fully confirmed by the subsequent researches of LAENNEC, ELLIOTSON, HOPE, and BOUILLAUD. M. BERTIN considered hypertrophy nearly as follows: 1st. *Simple hypertrophy;* the parietes of the compartments being thickened, the cavities retaining their natural dimensions; 2d. *Hypertrophy with dilatation;* the cavities being increased in capacity, and their parietes either of natural or of augmented thickness; the *Active Aneurism* of CORVISART, and the *Eccentric or Aneurismal Hypertrophy* of BERTIN; 3d. *Hypertrophy with diminution of the cavities;* the *Concentric Hypertrophy* of BERTIN.

158. The *second* of these, or *hypertrophy with dilatation*, is the most common. It presents two varieties: (*a*) That in which the walls of one or more compartments are thickened, and the cavity dilated; (*b*) That with the walls of natural thickness and the cavity dilated, or *hypertrophy with increased extent of the walls* (HOPE). In this latter variety there must necessarily be augmentation of the muscular structure, otherwise the dilatation would be attended by thinning of the parietes. The *third* of the above forms of hypertrophy is the next in frequency, and the *first* is the least common. For twenty cases of the second form of this lesion, not more than one is observed of the first. A thick parietes and a small cavity of either of the ventricles do not of themselves constitute concentric hypertrophy; for a violent contraction at the time of death may have produced this state. But in this case the bulk of the part would be proportionately lessened. To constitute, therefore, this form of hypertrophy, the parietes should not only be thickened, and the cavity be diminished, but the bulk should either be natural, or greater than natural. In this and the simple hypertrophy of the left ventricle, the thickness is sometimes double, or even triple what is natural. BOUILLAUD thinks that the concentric hypertrophy is more frequent and greater in the right than in the left ventricle; and adduces a case from BERTIN, where the parietes of the right ventricle were increased to sixteen lines; a thickness never observed in concentric hypertrophy of the left, although a less degree of thickening is oftener observed in the latter.

159. M. BOUILLAUD adduces several instances of hypertrophy with extreme *dilatation*. In one, the left ventricle could contain the closed hand. In another, the right ventricle could admit a goose's egg, while the left could contain the closed hand of a female. In a third, the right auricle of a child of seven years was filled with a coagulum as large as the hand of an adult. In concentric hypertrophy the cavities of the ventricles, especially of the right, may be *diminished* so as hardly to admit the thumb, or a pigeon's egg. LOUIS and BOUILLAUD have observed the cavity of the right ventricle even less than this. The columnæ carneæ generally participate in this form of hypertrophy, and thereby tend to diminish the cavity. In this ventricle, especially, they are often remarkably thickened and interlaced, and they may even subdivide the cavity, or traverse it, or be so hypertrophied as nearly to fill it (BERTIN, BOUILLAUD, and HOPE).*

160. Hypertrophy may be limited to a single compartment, or it may extend to two or more, and even, although rarely, to the whole organ. It is, in all its forms, more frequently observed in the ventricles than in the auricles, as the former are most obnoxious to the exciting causes (§ 165). In some instances one cavity is thickened, while another is attenuated. When hypertrophy with dilatation extends to all the compartments, the heart is often enlarged to three or four times its natural size. It then usually assumes a globular form, the apex being nearly effaced, and it lies transversely in the thorax, the diaphragm turning it in this position, and considerably to the left. It also arises high in the chest, and pushes up, and presses upon the lung of the left side. The situation of the greatest thickening is usually above the middle of the ventricles, where the fleshy columns take their origin; but an irregular form of hypertrophy is occasionally seen. The interventricular septum is not so often thickened as the external parietes. Hypertrophy may be confined not only to a single ventricle, but even to a part of it, as the base, the apex, the fleshy columns, or the external walls, the rest of the compartments being either natural or thinned. A ventricle may also be contracted in one part and dilated in another; but these latter alterations are comparatively rare. It is obvious that the heart will vary in its external form, according as the hypertrophy is confined to one compartment, or is extended to two or more, or as either form of this lesion predominates. When there is great dilatation, the fleshy columns are often stretched, flattened, or attenuated.

161. Hypertrophy of the auricles is generally attended by dilatation, the simple and concentric forms being very rarely observed in them—so rarely that LAENNEC does not appear to have

* [In order to form a correct opinion whether there is hypertrophy of the heart or not, it will be useful to call to mind the natural size of this organ. According to LAENNEC, the heart, comprising the auricles, ought to have a size equal to, a little less, or a very little larger than the first of the subject. The walls of the left ventricle ought to have a thickness a little more than double that of the walls of the right; they ought not to collapse when an incision is made into the cavity. The right ventricle, a little larger than the left, and having larger columnæ carneæ, notwithstanding the inferior thickness of its walls, ought to collapse after an incision has been made into it. In an adult of a medium height and well built, the mean weight of the heart is from eight to nine ounces; the mean circumference of the organ at its base is from eight to nine inches; the mean longitudinal and transverse diameters are three and a half inches (the transverse diameter, in general, rather exceeds the longitudinal); the mean antero-posterior diameter is about two inches. The mean thickness of the walls of the left ventricle at the base is from six to seven lines. The mean thickness of the walls of the right ventricle at the base is two and a half lines. The mean thickness of the walls of the left auricle is one and a half lines. The mean thickness of the walls of the right auricle is one line. The ventricular cavity, on an average, will contain a hen's egg, but the cavity of the right ventricle a little exceeds that of the left (BOUILLAUD.)—See BIZOT'S *Researches on the Dimensions of the Heart and Arteries*, in PENNOCK'S *Am. Ed. of* HOPE *on the Heart*, Phil., 1844.)]

met with these forms in this situation. The musculi pectinati are more enlarged than any other parts of the parietes of the auricles, and sometimes they alone are hypertrophied. Dr. Hope remarks that, as the musculi pectinati are larger and more numerous in the right than in the left auricle, it is in the former that the thickening proceeds to the greatest extent, the right auricle being thereby rendered nearly as thick as the right ventricle (§ 9).

162. *B. The Nature and Causes of Hypertrophy.*—The hypertrophied muscular tissue of the heart is generally of a livelier red hue than the natural structure, and at the same time firmer and more elastic. This circumstance, in connexion with that of hypertrophy, sometimes following inflammation of the external and internal membranes, and being even occasionally associated with inflammation of the internal surface of the aorta, has induced some pathologists—especially Bertin, Bouillaud, Andral, and Elliotson—to refer this lesion to inflammatory action; and they have considered the accompanying pain and sense of heat in the cardiac region occasionally complained of, the absence of any obstacle to the circulation in some cases, and the not infrequent complication of it with more or less recent inflammatory products on one or other of the surfaces, or with increased vascular injection, as proofs of this origin. M. Bertin quotes, in support of this view, the experiments of M. Chevalier, who found, on comparing a hypertrophied ventricle with a healthy specimen under the microscope, that the fibres of the former were much redder than those of the latter, and that, on steeping a portion of each in separate quantities of distilled water, the hypertrophied portion reddened the water more than the other, and when taken out was still the redder of the two. On being put in boiling alcohol, it was found to contain less fatty matter. On this point, which is one of some importance as regards the treatment, the writers just named contend, that although it may be considered that this lesion is most frequently produced by obstruction in the opening leading from the hypertrophied cavity, and depends upon increased muscular efforts to carry on the circulation through it, occasioning an increased circulation in the nutrient vessels, and hence augmented nutrition of the part; and although this undoubtedly obtains to a great extent, and amounts very nearly to one form of inflammation—to inflammation with a development of the formative process, yet hypertrophy does not always depend upon such obstruction; and even when it does, it may be considered not the less inflammatory, inasmuch as the obstruction, whether in the valves or in the state of the orifices, is almost always a result of, or an attendant upon inflammation, the obstruction, as well as the hypertrophy, proceeding from the presence or continuance of increased vascular action, especially of the nutrient vessels.

163. Notwithstanding these arguments, hypertrophy of the muscular tissue does not appear to be the immediate result of inflammatory action, although it is generally consequent upon the changes produced by this state of action, and is often associated with it in the other constituent tissues of the heart. Indeed, it is not unusual for inflammation to occur in these tissues in the course of hypertropny. Admitting that the obstruction to the circulation, productive of enlargement of one or more of the compartments, is not always seated at their openings, yet the inordinate action either caused by nervous excitement long continued, and by inflammatory irritation of the internal membrane, or required to overcome the impediments occasioned by false membranes and by adhesions of the pericardium, may so develop the muscular structure of a part, or the whole of the organ, as to constitute a very remarkable degree of hypertrophy, although the orifices are unobstructed. If the opinion I have contended for above (§ 6), that the heart possesses a power of active dilatation, as well as of active contraction, be admitted, the circumstance of causes which impede the dilatation of one or more of the cavities being attended by hypertrophy will be readily explained, and one of the arguments in favour of the opposite doctrine disposed of. When this lesion is seated in the ventricles, especially in the right, it is occasioned, perhaps, as frequently by these causes as by any obstacle to the onward current of the circulation. The increased firmness and elasticity of the hypertrophied structure is an additional evidence that this lesion is not in itself inflammatory, for it presents neither the friability and softening, nor the induration and morbid colour observed to follow inflammation.

164. Viewing, therefore, hypertrophy of the heart as the result of augmented nutrition consequent upon increased exercise of the muscular structure, the increased exertion requiring, and hence inducing a more active state of the circulation in this structure, it follows that whatever occasions this increase will, if long continued, give rise to this lesion, in some one or other of its forms, especially in young, sanguine, or plethoric persons, or while the powers of life are unimpaired. Whatever excites the nervous influence of the heart so as to produce long-continued palpitation, or demands from the organ a greater power, either of contraction or of dilatation, will produce it, particularly in the compartments having a more direct relation to such exciting cause. The more *remote causes*, therefore, of hypertrophy may be divided into, 1st. Those which act directly upon the nervous influence of the heart; 2d. Those which impede the onward current of the blood, and thereby occasion reaction of the muscular structure, in order to overcome the distending or opposing fluid; and, 3d. Those which encumber the muscular actions of the organ, and render either the contractions or the dilatations of its cavities more difficult, and require a more energetic exertion of these actions than natural. It must not, however, be supposed that the causes belonging to either of these orders produce the effect singly. Two or more of them, although belonging to different orders, often act in unison in producing this lesion.

165. *a.* The *exciting causes* which act primarily upon the nervous influence of the organ are, all the moral emotions, the other causes shown above to produce palpitation (§ 45, 46), and the physical agents which occasion increased circulation. Protracted muscular exertion, by returning the blood to the heart with great rapidity or force; a stimulating and rich diet, by exciting the heart, and, at the same time, loading

it with a rich blood; and the abuse of spirituous and intoxicating liquors, are often more or less directly concerned in the production of this lesion, although other causes frequently co-operate with them.—*b.* The causes which produce reaction by obstructing the circulation are chiefly mechanical, as the alterations in the orifices and valves already described (§ 66, 67); contractions, dilatations, and aneurisms at the commencement of the arterial trunks, especially the aorta; congestion of the lungs, or interrupted circulation through them, from diseases of their substance, or of the bronchial tubes, or of the pleura, or from emphysema, and from the accumulation of fluids in the pleural cavities; the frequent recurrence of spasmodic and convulsive affections, particularly asthma and hooping-cough, and whatever impedes the circulation in the aorta, vena cava, and principal vessels immediately connected with them, as wearing strait corsets, the gravid uterus, and large tumours. Under this head, also, may be mentioned insufficiency of auriculo-ventricular valves, either from atrophy or contraction of them, or from dilatation of the orifices. Contractions of these orifices, or obstructions caused by adhesions of, or excrescences upon the valves, will occasion hypertrophy not only of the auricles, but also of the ventricles—of the auricles, from the obstruction at their outlets, and the consequent distention of their cavities; of the ventricles, from the augmented force of dilatation required to fill them; the concentric form of hypertrophy depending chiefly upon this latter cause. Of the other causes of hypertrophy it is unnecessary to make particular mention, as they are of less frequent occurrence, and do not differ materially from those already noticed in connexion with excited action (§ 19, 45) and inflammations (§ 126) of the heart.

166. It may be stated, in general terms, that the same causes and lesions of structure which occasion *thickening* of the parietes of a compartment, or thickening with dilatation, will produce in other persons simple *dilatation*, or dilatation with *attenuation* of the parietes. The alterations of the thickness of the walls, as well as of the capacities of the cavities, seem to depend very much upon the states of vital energy and resistance, and of nutrition. In young and robust persons thickening of the walls, with or without dilatation of the cavities, of one or more of the compartments, will most likely occur; whereas in the delicate, the lymphatic, or leucophlegmatic, in the ill-fed, and in those either advanced in life, or exhausted by previous disease, dilatation, or dilatation with attenuation of the parietes, of one or more of the chambers, will most probably take place; but much, also, will depend upon the nature of the obstruction or cause out of which the hypertrophy or dilatation arises. Where the obstruction to be overcome is relatively greater than the power of the organ to overcome it, dilatation of the cavity more frequently takes place than thickening of the walls of that cavity; and where the obstruction is *before* the hypertrophied cavity, more or less dilatation is usually observed, the degree of thickening or of attenuation of the parietes depending upon the states of vital power and of nutrition, as just stated. Where, however, the obstruction is *behind* the hypertrophied compartment, thickening of its walls, with or without diminution of its cavity, is the common attendant. When the cause of hypertrophy is regurgitation of blood into the cavity, owing to insufficiency of the valves at the outlet, there is generally more or less dilatation; but there may be either thickening or attenuation of the walls, according to the states of vital energy and nutrition. Where there is actual thickening of the muscular substance, the coronary arteries are found proportionally enlarged, indicating a greater activity of the vital and nutritive actions of the organ. Dr. Hope considers that when hypertrophy is connected with an obstruction *behind* it, the alteration is owing to the retarded circulation in the veins, which is propagated through the capillaries to the arterial system, and ultimately to the heart. He thus explains the occurrence of hypertrophy of the left ventricle when the mitral orifice is contracted. But the active efforts made to fill the ventricle seem to me to be the cause of this association of hypertrophy (§ 165), for it is often observed where the extreme venous congestions, to which Dr. Hope's mode of accounting for it would necessarily give rise, are not met with.*

167. *C. The Complications of Hypertrophy of the Heart* are principally those morbid conditions of which the enlargement is a frequent consequence, particularly those just mentioned (§ 165), and chronic inflammations of the internal and external surfaces of the organ. These latter lesions, as well as disease of the orifices and valves, not only give rise to hypertrophy, but also often complicate it during its future course. When inflammatory irritation is induced in the internal membrane of the cavities, excited action of the muscular structure is the usual consequence; and when this is long kept up, hypertrophy will follow to a greater or less extent. When pericarditis is followed by adhesions or by false membranes, thickening of the walls of the compartments will also sometimes result; the increased action required, in this encumbered state of the organ, in order to keep up the circulation, developing and augmenting the muscular structure of one or more of the compartments. In these cases, additional lesions are often observed, particularly of the valves and orifices; and adhesions of the pericardium to the pleura, or other alterations of the collatitious viscera, frequently also exist.

168. Nothing is so common as to find one or more of the above changes of the internal and external surfaces of the heart complicated with hypertrophy. M. Bouillaud remarks that when inflammation of the external, and especially of the internal sero-fibrous tissue of the organ has become chronic, hypertrophy of the muscular structure is sure to follow. Of thirty-three cases which he records of pericarditis and endocarditis that terminated in thickening and

* [We are not, as yet, prepared to admit, with Mr. Copland, the doctrine of active expansion of the ventricles, especially as a cause of hypertrophy. It seems to us much more rational to attribute the enlargement to the excitement and increased action of the whole heart, caused by distention of its other cavities, thus leading to increased growth of the ventricle also. It hardly seems possible that the same fibres which encircle both ventricles can be excited in one and not in the other; or that the left ventricle, which is naturally the strongest and most active, should not be excited by sympathy or continuity of irritation, and this leads to a diminution of its cavity by the thickening of its walls.]

induration, there was not one in which there was not also hypertrophy. Indeed, this latter lesion may be associated with any of the alterations to which the pericardium and heart are liable, or even with several of them; and it may be, moreover, complicated with various changes of the arterial system, especially cartilaginous, osseous, and albuminous productions (see arts. Apoplexy, § 96, and Arteries, § 38, *et seq.*), aneurisms, &c.; or with congestions of related organs, particularly of the lungs, the brain, and the liver; or with effusion of serum into shut cavities, or into the cellular tissue; or with hæmorrhages from mucous surfaces, or into the substance of the larger organs, as the brains, lungs, liver, &c.

[The combinations of hypertrophy and dilatation are of frequent occurrence in proportion as they are higher in the following scale:

1. Hypertrophy, with dilatation of the left ventricle, and a less degree of the same in the right.
2. Simple dilatation of both ventricles.
3. Simple hypertrophy of the left.
4. Dilatation, with alteration of the left.
5. Hypertrophy, with contraction of the left.
6. Hypertrophy, with contraction of the right.

Of the Auricles.

1. Distention, particularly of the right, from congestion during the period of dissolution
2. Dilatation, with hypertrophy.
3. Simple hypertrophy.
4. Hypertrophy, with contraction, which is almost unknown.]

169. *D. Of the Influence of Hypertrophy, &c., of the Heart upon Cerebral and Pulmonary Hæmorrhage.*—It is unnecessary to add much to the remarks already offered on this subject in the articles Apoplexy (§ 96) and Hæmorrhage (§ 30, 107, 115); but certain points connected with it require to be considered at this place.—*a. Cerebral hæmorrhage* is probably a more frequent consequence of cardiac disease than pulmonary hæmorrhage, but facts are wanting to determine to what extent it is so. That it is more common is shown by Bertin and Bouillaud; and it may partly be accounted for by the fact of disease of the pulmonary arteries being much less common than alterations of the cerebral vessels. That an intimate connexion often exists between the occurrence of apoplexy and palsy, and antecedent disease of the heart, is now fully established, although doubts are still entertained by some as to the nature of the connexion. As long ago as 1822 and 1823, I discussed this question (*Lond. Med. Repos.*, vol. xviii., p. 149, and xix., p. 17), and in the article Apoplexy (published Sept., 1832) the results of my inquiries were again stated. The occasional dependance of cerebral hæmorrhage on disease of the heart was first remarked by Baglivi, who observed it in the case of Malpighi, who died apoplectic after palpitations caused by structural change of the heart. It was only incidentally mentioned by Morgagni and Lieutaud, and not insisted on in the relation of cause or effect until M. Richerand treated of it in his account of the case of Cabanis, in whom this complication was found. Portal, Testa, and Sprengel soon afterward expressed the same opinions as Richerand; and Rossi met with this association of disease in the case of the crown prince of Sweden. The frequent connexion between cerebral hæmorrhage and disease of the heart has been shown in this country by Hutchinson, Abercrombie, Craigie, Johnson, Hope, Watson, and myself; and in France by Bricheteau, Lallemand, Bertin, Cruveilhier, Bouisgais, Andral, and Bouillaud; and the effect upon the brain has been too exclusively limited to hæmorrhage, and too generally imputed to hypertrophy of the left ventricle. There is, however, every reason to believe that softening of the brain, congestions of the veins and sinuses, and serous effusions into the ventricles or between the membranes, occasionally, also, proceed from cardiac disease, especially when it causes obstructed circulation through the right side of the heart; and that cerebral hæmorrhage may sometimes depend upon the lesions in this situation, as suggested in the articles referred to.

170. M. Bricheteau has very recently investigated this subject at some length; but he has insisted chiefly upon the influence of hypertrophy of the left ventricle in the production of hæmorrhage in the brain. He has, however, remarked that other changes within the head besides this may result from this cause, especially determination of blood to the brain, mental disorder, serous effusion, brain fevers, &c. He observes that when hypertrophy is accompanied with other lesions of the heart, particularly with such as impede the free egress of the blood from the left ventricle, as disease of the aortic orifice, the symptoms of cerebral disorder are then much less conspicuous; and that dyspnœa, tendency to syncope, and dropsical effusions are more marked. M. Bouillaud found, out of fifty-four cases of hypertrophy, in some of which the right ventricle only was affected, and the left one not at all, or very little so, that there were eleven with cerebral disease, six with apoplexy, and five with softening of the brain. In five of these eleven the cerebral arteries were ossified or cretaceous at one or more points. In six of these cases the hypertrophy of the left ventricle was *eccentric*, in three it was *concentric*, and in two *simple*.

171. Dr. Watson (*Lond. Med. Gaz.*, April 6, 1835) has made some very judicious remarks upon this subject; but in all the material points, particularly in the explanation of the connexion between diseases of the heart and brain, he has been anticipated by the observations I have offered, both in the papers referred to above, and in the article Apoplexy (§ 96), where I have succinctly given the results of my own investigations. The views there entertained, as Dr. J. Johnson has done me the justice of stating (*Med. Chirurg. Review*, April, 1836, p. 512), in an able inquiry into this subject, are fully confirmed by his own experience, and by the more recently published researches of MM. Bouillaud, Bricheteau, and others. As the paragraph referred to in the article Apoplexy has so fully and completely anticipated the results at which subsequent writers on this subject have arrived, I have only to request the reader to turn to it, especially as I have nothing farther to add to it.*

* [Dr. Hope proves, from the statistics of St. Mary Le Bone Infirmary, that in fatal cases of apoplexy, hypertrophy of the left ventricle of the heart exists in more than three fourths of the cases.]

172. *b. The influence of cardiac disease on pulmonary hæmorrhage* has also been adverted to in the article Hæmorrhage (§ 30, 115). M. Bouillaud found this form of hæmorrhage less frequently to arise from lesions of the heart than that just noticed. He has adduced only three instances in which it seemed to depend upon hypertrophy of the right ventricle. And M. Bertin, while he admits the occasional connexion between pulmonary apoplexy and hypertrophy in this situation, considers it not common. A more intimate and more frequent dependance of the former on the latter has recently been contended for by M. Bricheteau. A different view of the connexion between pulmonary hæmorrhage and cardiac disease has been lately entertained by Dr. Wilson and Dr. Watson, particularly the latter. The dependance of dropsical effusions within the chest upon organic lesions in the left side of the heart has been long known; but the connexion between hæmorrhage from the respiratory surfaces and these lesions had been entirely overlooked. Mr. A. Burns seems to have been the first who took a judicious view of the subject. He observes that the pulmonic vessels, by the congestion occasioned by cardiac disease, and the continued *vis à tergo*, are ruptured, the blood being forced into the air-cells, or into the cellular structure of the lungs, until this organ appears like liver, or sinks in water. Dr. Watson has very fully shown that the pulmonary hæmorrhage rarely depends upon hypertrophy of the right ventricle, but chiefly upon narrowing of the left auriculo-ventricular orifice, or rigidity of the mitral valve. Indeed, hypertrophy of the right ventricle seldom exists without disease at the origin of the pulmonary artery sufficient to counteract the increased action of the ventricle. It is, therefore, the obstructed return of blood from the lungs, owing either to narrowing or to dilatation of the left auriculo-ventricular orifice, or to insufficiency of the mitral valve, and but rarely the increased impetus occasioned by the hypertrophied right ventricle, that causes any of the forms of pulmonary Hæmorrhage (§ 107, 115). M. Bertin admits the influence of narrowing of the left auriculo-ventricular orifice in the production of hæmorrhage into the lungs, and considers the hæmorrhage thus caused to be of a more gradual and passive kind than that produced by hypertrophy of the right ventricle. Dr. Townsend (*Cyclop. of Pract. Med.*, vol. i., p. 138) states that, of twenty-two cases of pulmonary apoplexy examined by him, more than two thirds occurred in persons whose hearts were diseased, and in two only of these was the hæmorrhage connected with tubercles; but he has neglected to assign the particular lesions of the heart observed in these cases. The very frequent dependance of pulmonary apoplexy on cardiac disease has been insisted upon, also, by Chomel, Andral, Cruveilhier, Bouillaud, Hope, and others, but with a great want of precision as respects the seat and nature of the primary malady. That cases sometimes occur in which hypertrophy of the right ventricle is associated with narrowing of the left auriculo-ventricular orifice in the production of pulmonary hæmorrhage is shown by an interesting case recorded by Dr. Law (*Cyclop. of Pract. Med.*, vol. ii., p. 403). A young lady had repeated hæmoptysis, with palpitations, which were more frequent and profuse until death. Both lungs were found engorged with blood, &c. The right ventricle was hypertrophied and dilated; the left auricle dilated and thickened; the left auriculo-ventricular orifice contracted so as hardly to admit a quill; and the left ventricle contracted. The pulmonary artery was dilated and thickened; the aorta was smaller than natural. In this case, the congestion of the lungs, consequent upon obstructed circulation through the left side of the heart, had not only caused hæmorrhage, but also hypertrophy of the right ventricle.

173. It is, moreover, very probable, as I have stated in the article Hæmorrhage (§ 115), that when the more powerful moral emotions are productive of hæmoptysis, this effect is owing as often to their impeding the circulation through the *left* side of the heart as to their exciting the action of the right ventricle; and that, when the same emotions occasion apoplexy, palsy, or any other cerebral disease, they act as frequently by interrupting the current through the *right* side, as by inducing inordinate action, or hypertrophy, of the left ventricle. It is, however, to be presumed that the opposite passions produce opposite effects upon the heart, and that, while terror, fear, grief, anxiety, and other depressing passions impede the circulation through this organ, and cause congestion of its cavities, thereby favouring the occurrence of hæmorrhagic or serous effusions either in the head or in the chest, the exciting passions, as anger, desire, revenge, &c., accelerate and increase the force of the circulation, by exciting the actions of the ventricles. From this it will appear that the same class of emotions may induce effusion into either the brain or lungs, according to the predisposition or previous state, functional or structural, of these organs, and to the side of the heart chiefly affected by them; and that, while the depressing passions act by interrupting the circulation through the heart, and, consequently, by impeding the return of blood from these parts, the exciting emotions operate by increasing the frequency and power of the ventricular contractions, and by propelling the blood with greater force into these organs.

174. *E. Symptoms and Diagnosis of Hypertrophy of the Heart.—a. The local signs* consist chiefly of a permanent increase of the force of the heart's contractions, of the sphere within which they are perceived, and of the double sounds attending them. These signs—the permanently increased force, extent, and sounds of the heart's actions—are always present; but they vary considerably, and are attended by other phenomena—commonly by an increased extent of dulness on percussion in the cardiac region, and often by some degree of prominence of this part, particularly in young persons. Where hypertrophy is considerable, the movements of the heart are visible in a large extent of the left side of the chest and towards the pit of the stomach, and often through the clothes. The apex of the heart is felt more to the left, and generally at the sixth, seventh, or eighth intercostal space, while the base corresponds with the third, or even the second intercostal space. On applying the hand upon the cardiac region, a stronger, a more extensive, and long-

er enduring *impulse* or *shock* is felt, consisting not only in the striking of the apex, but also in the pushing of the ventricle against the ribs, as the latter swells in each contraction. In these cases, the head, or stethoscope, on auscultation, is raised by the force of the impulse. The first *sound* is generally prolonged and duller than natural, and the more so the greater the hypertrophy or thickening of the ventricle. But when the thickening is moderate, and the cavity is somewhat dilated, the sounds are stronger and clearer than natural, and heard over a more extended sphere. When the thickening is very great, and the cavity diminished, the sounds become nearly or altogether imperceptible. In simple hypertrophy, the sounds are not usually otherwise morbid; but when there is disease of the valves, then the sounds characteristic of this disease are heard.

175. In proportion as *dilatation* is great, the impulse is slighter, brisker, and lower than natural; and the first sound is louder, clearer, and of shorter duration. The greater the thickening of the walls, the duller are the sounds, compared with the force of the shock or impulse; and the greater the dilatation of the ventricular cavities and attenuation of their parietes, the clearer, louder, and shorter are the sounds, in relation to the force of the impulse; which, in cases of great dilatation, is much less than natural. Where the enlargement consists chiefly of dilatation, as well as where thickening predominates, the sounds will be otherwise altered, according to associated disease of the valves or orifices of the organ. In *hypertrophy* with slight dilatation, as Dr. Williams remarks, there is a strong heaving impulse, with an abrupt collapse or back stroke, and a prolonged, diffused, but not clear sound. In *dilatation* with slight hypertrophy, the sound is loud, commencing abruptly, and heard over a large space; while the impulse is unnaturally great only when the heart is excited, as in palpitation, when it produces hard, abrupt, and circumscribed blows, without heaving. The palpitations attending hypertrophy will be violent and heaving when the thickening predominates; but noisy, fluttering, and accompanied with a feeling of faintness when dilatation is the chief lesion.

176. Cardiac hypertrophy is seldom accompanied with *pain*; but when it is considerable, or very great, a sensation of uneasiness, of weight, or of anxiety is often felt in the præcordia or at the epigastrium. *Dulness* on percussion is in relation to the extent of hypertrophy and dilatation, and is observed to extend downward and towards the left side, owing to the explanations given above (§ 160), unless when the heart is confined by adhesions. *Prominence* of the cardiac region is not uncommon when the hypertrophy is great. Bouillaud has directed particular attention to this sign; but it has been incidentally noticed by others.

177. *b. The general or rational symptoms* vary much with the form of hypertrophy, and with the other lesions of the heart with which this is associated. The *pulse*, in simple and eccentric hypertrophy, is generally strong, large, full, vibrating, and free; but it is small or oppressed in the concentric variety. When there is also disease of the left orifices and valves, the pulse is weak, small, or otherwise affected. Where the hypertrophy is simple, the face and general surface are animated, the animal heat is developed, and a tendency to active hæmorrhage sometimes observed. The venous circulation is also unimpeded, and neither sanguineous nor serous congestions or effusions take place. But when the hypertrophy is complicated with lesions, interrupting the passage of the blood through the heart, the pulse is weak, small, and irregular; congestions or effusions of blood, and dropsical infiltrations and collections, being common results. *Respiration* is but little disturbed as long as the hypertrophy is moderate and simple. But when it is excessive, it then encroaches on the lungs, and causes *dyspnœa*; and, as this state is usually a consequence of impeded passage of blood in the heart, causing congestion of the lungs or serous infiltration of their substance, the dyspnœa is principally owing to these circumstances. Indeed, the majority of sympathetic phenomena observed in connexion with hypertrophy are no farther dependant upon this lesion than that they result from the same alterations as it. *Cough* is seldom present in the early stages, especially when the hypertrophy is confined to the left ventricle; but when sanguineous or serous congestion supervenes in the lungs, this symptom is commonly observed. *Œdema* occurs when the hypertrophy is very considerable, and is attended by dilatation. It often appears first in the eyelids and face; and, as the obstruction to the circulation through the heart increases, the serous infiltration augments, and becomes more general. In simple hypertrophy, the *countenance* retains its complexion, or is more than usually florid; but when there is dilatation, and in proportion as the enlargement is complicated with obstructed circulation, and as the obstruction extends to the lungs, the lips, cheeks, and even the nose present more and more of a purplish tint, and the *general surface* assumes a sallow and cachectic hue. *Apoplectic, paralytic*, or *convulsive attacks*, and *pulmonary hæmorrhage*, have been already noticed as consequences of hypertrophy, particularly of its more complicated states. *Epistaxis* sometimes occurs, and prevents or defers the occurrence of either of these, or of some other serious symptomatic malady.

178. *c. The signs and symptoms of Hypertrophy of the individual compartments* require some notice, those just mentioned having reference to this change of the ventricles generally. The physical signs of hypertrophy of the auricles cannot be stated with any precision in our present knowledge; but, as this change is usually associated with hypertrophy of the ventricles, the distinction between them is not material. *Hypertrophy of the left ventricle* may be recognised by the following signs: The impulse of the heart is greatest under the cartilages of the fifth, sixth, seventh, and eighth left ribs; and in this situation there is the most dulness on percussion, and prominence of the thorax. The pulse, if there is no obstruction at the aortic orifice, is strong, tense, full, vibrating, or hard; the face is flushed, and the patient experiences throbbing headaches, giddiness, and sometimes even epistaxis. *Hypertrophy of the right ventricle* is attended by a palpitation, or an impulse, which is strongest under the lower part of the sternum, where, also, is the greatest dulness on percussion, especially if this lesion be not

associated with hypertrophy of the left ventricle; and the pulse possesses neither the force nor tension observed in this latter alteration. There are commonly more or less dyspnœa, short breathing, cough, and, subsequently, expectoration and lividity of the face; but, as I have shown above (§ 172), these symptoms are still greater, and more frequently attended by hæmoptysis when the lungs are congested in consequence of interrupted circulation through the left side of the heart, with which, however, this form of hypertrophy is occasionally associated. Turgescence, pulsation, or undulation of the jugular veins, was noticed as a symptom of this alteration by Lancisi; was rejected by Corvisart; but admitted by Laennec and Hope. Bertin and Bouillaud consider that it is present chiefly in hypertrophy with dilatation, extending to the auricle, and when the right auriculo-ventricular orifice is imperfectly shut during the systole.

179. *F. Terminations and Prognosis.—a.* As long as hypertrophy continues simple and moderate in degree, the patient may experience but little inconvenience from it beyond slight dyspnœa and palpitations, particularly on exertion. But if intemperate living be indulged in, or great corporeal exertion be resorted to, the disease will increase rapidly, and will lead to farther change either of the heart or of the more immediately related organs, especially of the brain and lungs. The *progress* of the malady will consequently vary with the peculiarities and complications of the case, and with the habits, occupations, and treatment of the patient. The *terminations* of hypertrophy depend, also, very much upon the same circumstances. In its simple states, apoplexy and active hæmorrhages are its occasional consequences (§ 169); but, if these result not from it, the patient may live many years. When hypertrophy is attended by much dilatation, the symptoms are more severe, and its course more rapid. It does not so frequently cause apoplexy as the foregoing state, but it is generally accompanied with greater disorder of the respiratory functions. Dr. Hope remarks that, when this form of the disease demands, owing to the palpitations and dyspnœa, periodical bleedings at short intervals, it hurries, with an uninterrupted course, to its fatal termination. In the majority of such cases, however, bleedings are not the appropriate means of alleviation.

180. Both the progress and termination of the malady, and consequently the prognosis, more especially depend upon the pathological causes and complications of it. When these consist of diseased valves or contracted orifices, the hypertrophy and dilatation usually proceed to a greater extent, and the balance of the circulation is more disturbed than in the simple form of the complaint. In such cases, congestions, and even effusions of blood, or of serum, generally supervene, either in the substance of important viscera, or on venous or serous surfaces, and occasion various consecutive maladies, according to the particular lesion of the heart, and to the consequent seat of congestion, effusion, or infiltration of parenchymatous structures. Hence result pulmonary hæmorrhage, &c., œdema, or effusion into the bronchi, or into the pleural cavities, &c., followed by asphyxy. Abolition of the functions of the lungs causes stupor, or accelerates the alterations which often take place in the brain, especially congestion and sanguineous or serous effusions; or these latter are the first to occur, especially when the primary lesion is in the right side of the heart (§ 169).

181. *b.* The *prognosis*, it is evident from the foregoing, is generally *unfavourable*, especially in the more complicated cases, in proportion to the extent of lesion of the orifices and valves, and where hypertrophy is accompanied with adhesion of the pericardium. Debility, age, a cachectic habit of body, and disease of the lungs also increase the danger, or, rather, render it more imminent. In the simple states and early stages of the malady, when the constitution is not impaired, and when the patient can be subjected to appropriate treatment, and is so circumstanced as to pursue it, the prognosis is much more *favourable*; and, although the alteration already existing may not be diminished, its progress may be arrested.

182. *G.* Treatment. — The circumstances which influence the terminations of hypertrophy and the prognosis of it should also control the treatment. The simple form of the malady, particularly in young and otherwise sound persons, requires very different means from the complicated, especially when occurring in broken-down constitutions: in the former, *vascular depletions* may be employed, and repeated from time to time; in the latter, they require great caution and discrimination, or they may be injurious. Laennec and Bouillaud advise blood-letting and other reducing and tranquillizing means, in the manner recommended by Albertini and Valsalva, and to a decided extent. But I agree with Dr. Hope in considering these measures hazardous, and often injurious, when pushed as far as these writers direct. M. Laennec, especially, insists upon copious depletion at the commencement of the complaint—upon a repetition of it every two, four, or eight days, until the palpitations cease, and the heart gives only a moderate impulse—upon spare diet, with very little or no animal food—and upon physical and mental repose. If the treatment is not commenced until hypertrophy has occasioned dyspnœa, dropsical effusions, œdema of the lungs, &c., he still advises bleeding and abstinence; and, in all cases, a perseverance in this plan, especially in abstinence, for many months; and he has no confidence in a cure until the expiration of a year (if the patient live as long) of complete absence of all the symptoms and physical signs of hypertrophy. As to *blood-letting*, the opinion of M. Bouillaud is not materially different from that of Laennec. He prescribes, for an adult of medium strength, and for a medium degree of the complaint, three or four bleedings at the arm, each consisting of twelve or sixteen ounces, followed by one or two cuppings on the præcordia of eight or twelve ounces each, in the course of the treatment. He considers *digitalis* as the next most important remedy—as the true opiate of the heart; and employs it both internally and endermically. He applies a blister on the præcordia; and he sprinkles the blistered surface with from six to fifteen grains of powdered digitalis, directing, at the same time, and long afterward, mental and bodily repose, and a very restricted diet.

183. *a*. Respecting *blood-letting* in this malady, my experience and opinions are in accordance with those of Dr. Hope; and I consider, with him, sparing abstractions of blood, at intervals of two or three weeks or more, to be the most beneficial. More copious depletions have given temporary relief, but the symptoms have soon returned with increased violence and carried off the patient, especially in cases where there were also dilatation and lesions of the valves or orifices of the heart. As I have shown in the article Blood (§ 58), large depletions increase the frequency of the heart's action; and this effect is more readily produced by them when this organ is in a state of enlargement. I perfectly agree with the above writer in considering that the indications of treatment should be to diminish the quantity, without deteriorating the quality of the blood, and without producing reaction, or permanently enfeebling the action of the heart and the energies of the constitution; that from four to eight ounces of blood, taken every two, three, four, or six weeks, according to the circumstances of the case, will be sufficient to fulfil this indication, to keep down inordinate action, and to relieve the dyspnœa; that the diet should be spare, and consist of white animal food, and liquids in small quantity, and that everything heating or stimulating, or calculated to accelerate the circulation, ought to be avoided.

[In the treatment of this affection, our first aim should be to remove any exciting cause of the malady, as violent exercise, intemperance in food or drinks, mental excitement, &c.; and as it consists in an increased power and action of the heart, a reducing and tranquillizing treatment will be appropriate. The plan, however, of rapid depletion by general bloodletting, so strongly urged by Valsalva and Albertini, and more lately by Laennec, has at present but few followers among judicious practitioners. We formerly tried the plan recommended by Laennec in several instances, abstracting blood as copiously as the patient could bear without falling into a state of sinking, repeating the operation every few days until the palpitation ceased, and the heart gave but a moderate impulse under the stethoscope, at the same time diminishing, by one half, the quantity of aliment which the patient usually took. In the early stages of hypertrophy, sparing abstractions of blood at intervals of two or three weeks or more, we have found very useful; but, in the latter periods of the disease, bleeding has generally exasperated all the symptoms, especially the dropsy, and paroxysms of dyspnœa.

Repeated blood-letting inevitably brings on a state of *anæmia*, characterized by a diminished proportion of fibrin and red globules, and always attended with a quick, jerking beat of the heart and arteries, palpitation and breathlessness on exertion or excitement, and that disposition to serous infiltration usually called dropsy from debility.]

184. *b*. Much benefit will result from a judicious selection of *internal medicines*. Of these, *digitalis*, *colchicum*, the *sub-borate of soda*, *mercurial alteratives*, *hydriodate of potass*, *refrigerants*, and *diuretics* are most deserving of notice. The secretions and excretions should be freely promoted by a mercurial alterative taken at bedtime, and a mild purgative in the morning. Equal parts of infusion of digitalis and *camphor mixture* may be also given twice or thrice a day with five or six grains of the sub-borate of soda; or small doses of *colchicum*, with an alkaline subcarbonate, may be prescribed in an infusion of *tilea Europea*, or decoction of marsh-mallows. Diuretics are also of service, especially the super-tartrate of potash with the sub-borate of soda, in the compound decoction of broom-tops, or in a weak infusion of senega, or in camphor julap, or in the decoction of taraxacum—the nitrate of potash or soda, with spirits of nitric æther—and the acetate of potash, with small doses of squill, or the infusion or spirit of juniper. When dropsical effusions take place, these, varied according to the peculiarities of the case, and aided by hydrogogue purgatives, are required; and one or other of the liniments prescribed in the *Appendix* (F. 297, 311), with the addition of a little of the hydriodate of potash, may be rubbed or applied over the thorax daily. When the breathing becomes much affected, camphor, with small doses of ipecacuanha, and with hyoscyamus or belladonna, &c., may be tried; and when debility or irritability is urgent, camphor, conjoined with hydrocyanic acid, or with digitalis and the extract of hop, or with gentle tonics and other narcotics, as the acetate of morphia, will be very serviceable. Digitalis was much praised by Ferriar in palpitations from organic lesions; and, when hypertrophy is attended with excessive action and distressing irritability, the following will be found useful:

No. 256. ℞ Infus. Digitalis ℥vijss.; Potassæ Nitratis ʒij.; Acidi Hydrocyanici ♏xiv.; Sirup. Aurantii ʒij.; Misce. Capiat æger Coch. i., amplum secundâ quâque horâ.

185. *c*. When *diseases of the valves and orifices* of the heart have been concerned in the production of hypertrophy, the treatment is not materially, if indeed at all different from what is here advised. The fixed alkalies, especially the liquor potassæ, may be given in suitable combinations, as with digitalis, camphor, and various diuretics. The internal exhibition of the hydriodate of potash has been tried by me in several cases, but the results have not always led me to persist in the use of it in cardiac hypertrophy from this cause. It may, however, be given in small doses with liquor potassæ; it will then not be injurious.

186. *d*. *External derivatives*, especially setons or issues, inserted near the margins of the false ribs, or below them, have been prescribed by me in several cases, and in some with marked advantage. In every instance the treatment should be assiduously persisted in, and a most abstemious diet and regimen rigidly observed. Repose of mind and body, and residence in a dry and pure air, are also most beneficial. As the features of the disease vary, so should the treatment be modified, care being taken not to reduce the vital energies too low. As soon as exhaustion appears, it ought to be met by restorative means. Where a free discharge is procured by setons or issues—which are especially indicated when the hypertrophy has been consecutive of rheumatic disease of the heart—a gently tonic treatment will be often requisite; and if any preparation of col-

chicum be exhibited, it should be given with camphor or ammonia, or even with stomachic or gentle tonics.

ii. Of Dilatation of the Chambers and Orifices of the Heart. — Syn. *Cordis Aneurisma*, Ballonius, Baglivi; *Passive Aneurism of the Heart*, Corvisart; *Cardieurysma, Cardiectasis*, Auct.; *Expansion of the Heart's Cavities.*

187. Charact.—*Slight palpitations, with dyspnœa and cough; the impulse of the heart being weak and diffused; the sounds being louder, clearer, shorter, and heard over a larger extent of the chest than natural; and the pulse being weak, small, or irregular.*

188. *A.* Description.—*Dilatation* (*a*) may affect equally *the whole parietes* of one or more of the cavities; or (*b*) it may be so confined to *a portion of the parietes* of a chamber as to form an aneurismal pouch.—*a.* The *first* of these varieties usually presents itself in *three forms:* 1st. *With thickening of the walls* of the compartments. 2d. *With a natural state of the walls;* and, 3d. *With attenuation of the walls.* The *first* of these has been considered in connexion with *hypertrophy*, and most of the remarks made with respect to it also apply to the *second* of these forms. It is chiefly, therefore, to the *third*, or to *dilatation with attenuation* of the parietes of the chambers, that attention is now directed. The muscular substance of the heart is often healthy, although dilated; but it more frequently is soft, flaccid, or even remarkably softened, especially when the attenuation, as well as dilatation, is great. Sometimes its structure is readily broken down by the pressure of the finger, and is of a deeper or darker red, or of a paler or more fawn-colour than natural. The more remarkable states of softening observed in connexion with dilatation have been consecutive of inflammation of one or other of the surfaces, probably extending, in some degree, to the substance of the heart, and occurring in debilitated, previously diseased, or cachectic constitutions.

189. This lesion of the heart is much rarer than dilatation with thickening, or with a natural state of the parietes of the cavities; and the instances recorded of it are not numerous. Lancisi, Morgagni, Corvisart, Bertin, Kreysig, J. Frank, Laennec, Louis, and Hope have described but few cases of it. Burns and Laennec believed that rupture might proceed from dilatation; and Dr. Hope and Dr. Williams have met with this occurrence, which is most likely to take place in aged persons. Dilatation with attenuation seldom affects one ventricle without the other; but it is more common, or greater in the right than in the left ventricle. It more rarely is seated in all the chambers of the organ. The attenuation exists in various degrees. It may be so extreme that the walls of the ventricles hardly are equal to two lines at the thickest parts (Hope and Chomel). The fleshy columns are usually stretched and spread out. The interventricular septum is proportionately less attenuated than the other parts. The dilatation is more in the tranverse than in the longitudinal direction of the ventricles, the heart thereby assuming a spherical form, and the apex being nearly effaced. When both the ventricle and auricle of the same side are much dilated, the intermediate *orifice* is generally also widened, and the valve *insufficient* to close it. As in cases of hypertrophy, the position of the organ is somewhat altered when the dilatation is great, it being more or less transverse, and towards the left. A very slight attention is sufficient to distinguish the distention that takes place during the last moments of life from morbid dilatation. The former is slight, presents the appearance of tension, and the muscular substance is healthy, the organ often resuming its natural size when emptied. The latter consists not only of distention, but also of flaccidity, thinning, and softening of the parietes.

190. *b. Partial dilatation of one of the heart's cavities* is but rarely met with. M. Bertin states that he has seen one portion of a cavity dilated, and another in its natural state, or even thickened, especially in the right ventricle, near the pulmonary artery. This is evidently a slighter grade of that lesion which has attracted, more recently, considerable attention under the appellation of "*false consecutive aneurism*" (Breschet), "*sacculated aneurism*," and "*true aneurism of the heart*" (Ollivier). This alteration has been observed by Galeati, Buttner, Corvisart, Baillie, Zannini, Berard, Rostan, Cruveilhier, Breschet, J. Johnson, Elliotson, Adams, Dance, Reynaud, &c. It was found in the heart of Talma, the celebrated French tragedian. It is exactly similar to the aneurism of large arteries, and has been met with only in the arterial side of the heart; and, excepting in a single case recorded by Dr. Elliotson, where it existed in the left auricle, always in the left ventricle. In many of the cases it was found at the apex; in some at the base, or at the middle of the ventricle; and in others at the front or side. In this last situation it was detected in Talma. In the instances which occurred to Reynaud and Elliotson two aneurisms were found in the same ventricle. This form of aneurismal tumour varies in *size* from that of a filbert to that of the heart itself. The larger tumours usually contain layers of dense coagula, similar to those which fill the cavities of arterial aneurisms. They communicate with the ventricle by a more or less narrow opening, which, with the whole of their interior surfaces, is generally lined with a membrane continuous with that of the ventricles. Like other aneurisms, they are most common in adult males.

191. *c. Dilatation of the orifices of the heart* is not less frequent than expansion of the cavities, and often coexists with it. The orifices may be dilated in various degrees, as already shown (§ 189); but generally, when the change is very considerable, the valves become insufficient for their purposes, and the expansion, owing to the regurgitation into the auricles, extends to them. The auriculo-ventricular orifices are most frequently dilated, but in very rare instances the arterial orifices have experienced this alteration in a slight degree.

192. *B. Causes.*—*a.* Most of the causes, remote and immediate, of hypertrophy are also those of dilatation of the *chambers* and *orifices* of the heart. As Dr. Hope observes, dilatation is merely a mechanical effect of over-distention. Blood accumulated within the cavities, owing to an interruption to its exit from them,

will dilate and attenuate their parietes, in proportion to the resistance opposed, and to the force exerted by the muscular structure, in order to overcome it. When that force is weak, or insufficient to overcome the resistance, the parietes yield, and the cavities undergo dilatation with a rapidity depending upon the weakness of the walls and the extent of interruption. It necessarily follows that the cavity immediately behind the seat of obstruction will be the first to undergo dilatation, and will experience it to the greatest extent. The compartment, also, having the weakest parietes, is, *cæteris paribus*, the most frequently dilated. Permanent dilatation is the result of prolonged or repeated causes, as contractions of an orifice, disease of the valves, and frequent returns of nervous palpitations. The depressing passions and emotions, as anxiety, fear, &c. (§ 19), and whatever tends to weaken the power of the heart, may occasion this alteration. The walls of the cavities may also be unusually weak or thin, *congenitally* and *hereditarily*. Lancisi observed this lesion in four successive generations; and Albertini saw a female die of dilatation, five of her brothers having been cut off by the same malady. It is most common in persons of a tall, thin, delicate, feeble, and nervous or lymphatic conformation and lax fibres. *Age* has also great influence on its production. It is not uncommon in young children, but it is most frequent in the aged. It rarely occurs in young adults, unless it has been induced by masturbation, or by fevers and diseases of the respiratory organs. In general, all obstructions to the circulation, whether situated in the orifices of the heart, or in the aortic or pulmonary system, will produce it as well as hypertrophy, the supervention of the former being the result chiefly of debility of the organic nerves supplying the organ, and of impaired tone or deficient nutrition of the muscular structure; of antecedent disease, characterized by debility or cachexia, or by both.

193. *b.* When the *auricles* are protected by a natural state of their valves, and of the auriculo-ventricular orifices, the ventricles may be dilated without the former being materially affected; but when the auricular valves are diseased, so as to occasion interruption to the passage of the blood from the auricles, or when the auriculo-ventricular openings are dilated, so as to permit regurgitation from the ventricles, then the auricles become dilated, although rarely without some increase in the thickness of their parietes.

194. *c. The diseases of which dilatation is most frequently consecutive* are, inflammations of the heart, and the lesions of the valves and orifices caused by them; rheumatism extending or translated to this organ; tubercular consumption; asthma and emphysema of the lungs; secondary syphilis, especially when treated by excessive quantities of mercury (Albertini); adynamic, typhoid, and exanthematous fevers; scurvy, and carcinomatous and hæmato-encephaloid maladies. M. Bertin contends that dilatation is generally consequent upon some obstacle to the course of the blood; and that the obstacle, at the same time that it gives rise to this lesion of the heart, produces other phenomena, as engorgement of the vessels, serous effusions, passive hæmorrhages; these phenomena, as well as the dilatation, being the result of the same proximate cause. Dr. Hope justly observes that the change in the capacity of the cavities may result not only from obstacles to the circulation, but also from debility. There can be no doubt of deficient tone of the muscular parietes, and of the softening and asthenia of the organ, shown to follow adynamic fevers, and of protracted nervous palpitations, particularly when connected with chlorosis, anæmia, &c., being sufficient to cause dilatation of one or more of the chambers of the heart, independently of any appreciable obstacle to the circulation. Curvatures of the spine, and whatever diminishes the cavity of the chest, or presses inordinately upon the large vessels, may also occasion this alteration.

195. *d.* The same *causes* and *pathological conditions* which occasion the expansion of a whole compartment or of an orifice may give rise to the dilatation of a portion of it only in the form of an aneurismal cavity, especially whatever opposes the transmission of blood from the heart, as laborious occupations, the more violent mental motions, as hatred, revenge, jealousy, anger, &c. This—the only lesion of the heart which ought to be called aneurismal—may be produced independently of inflammatory action, owing to great muscular efforts, or obstacles to the circulation. Where the internal membrane is not destroyed nor thickened, and where the muscular fibres are stretched, separated, or ruptured, antecedent inflammation may not have existed; but where there is thickening of the internal membrane, or ulceration, or adhesion of the external surface of the dilated part to the pericardium, this lesion may be considered to be a more or less remote consequence of chronic inflammation, affecting a portion of the parietes of the ventricle, the dilated part having lost its elasticity and contractile power. In connexion with this, some obstacle to the circulation, or to the passage of blood from the left ventricle, has frequently also been present; the increased lateral pressure arising from impeded circulation dilating or extruding the most softened, weakened, or yielding portion of the ventricle. In the unique case of aneurism of the *left auricle* recorded by Dr. Elliotson, there were extreme cohesion and ossification of the mitral valve, and consequent reduction of the auriculo-ventricular opening, changes always consequent upon inflammatory action, as above insisted upon (§ 68). The sinus of the auricle formed a large aneurism, containing dense and thick layers of fibrin; the interior of the tumour being lined with the smooth membrane of the cavities, as in aneurism of the ventricle.

196. *C. The Signs and Symptomatic Effects of Dilatation* have been partly noticed under the head of hypertrophy with dilatation (§ 175); but those which more especially indicate dilatation with attenuation remain to be detailed. —*a.* When the affection is considerable, and extends to both ventricles in uniform expansion of the parietes, the heart acquires a rounded shape, and the degree of contraction is lessened; and, as the apex is consequently less forcibly impelled against the ribs, the impulse is slight, brisk, and low in the præcordia. The first sound of the heart is shorter, louder, and

clearer than usual, and is heard over a larger extent than would be expected from the weakness of the impulse. When the dilatation is considerable, the first sound resembles in shortness and flapping character the second, and is to be distinguished from it only by its synchronism with the pulse of the carotids (Laennec, Hope, Williams). When the dilatation is dependant upon disease of the valves and narrowing of the origins of the arterial trunks, the sounds will assume a morbid character accordingly (§ 76). The pulse, in dilatation of the ventricles, is necessarily feeble, and often small; and various symptomatic lesions are observed, which, however, are referrible rather to the alteration that has produced the dilatation than to the dilatation itself. In expansion of the left ventricle, the physical signs are most apparent to the left of the sternum, between the fifth and eighth ribs; and the symptomatic phenomena consist chiefly of dyspnœa, oppression in the præcordia, and dropsical effusions in the chest, &c. In expansion of the right ventricle, the physical signs are most evident under the sternum, and are accompanied with a pulsating swelling of the jugulars, especially if the dilatation extend to the auriculo-ventricular opening; the sympathetic changes being principally serous effusions within the cranium, or in the cellular tissue, ascites, œdema of the extremities, short breathing, and various signs of general cachexia.

197. *b.* The *symptoms of partial dilatation* (§ 190) of the cavities are extremely obscure. Those stated by Dr. Baillie are common to all cardiac diseases. Auscultation renders us little or no assistance in ascertaining its existence. It rarely attains a large size—never so large as to produce an external tumour. The cases recorded by M. Reynaud and Dr. J. Johnson terminated in rupture of the aneurism without any previous suspicion of its existence. Dr. Elliotson's and M. Cruveilhier's cases presented symptoms which merely led to a belief in the existence of organic disease of the heart. In one of the two cases mentioned in the catalogue of the preparations belonging to the medical department of the army, the patient had complained of cough, dyspnœa, pain in the chest, and hæmoptysis; in the other, the symptoms were not ascertained. Talma died of stricture, amounting nearly to obliteration of the rectum. The aneurism of the left ventricle was small, and filled with concentric layers of fibrin. It was remembered that long previously, after having enacted the part of Orestes, in the play of Andromache, Talma felt himself strangely agitated, anxious, and restless for some time; but these symptoms gradually subsided. It was supposed that the internal membrane, or some of the fibres of the muscular structure, had then given way, the consequent effusion of coagulable lymph producing a partial and temporary cure. Others of the cases upon record have been equally obscure, while some have been attended by palpitations, urgent dyspnœa, cough, and short breathing; anxiety, pain, and constriction at the præcordia; weak, irregular, or intermittent pulse; inability to lie otherwise than on the back; sudden starting up from sleep, œdema of the extremities, &c.

198. *c.* Dilatation of the *orifices* gives rise to no indications of its existence, unless it is so considerable as to permit a reflux of the current of blood, and even then the signs are equivocal. This reflux is one of the causes of the bellows sound, and of the purring tremour, When it takes place through the right auriculo-ventricular orifice, it causes a venous pulsation, particularly in the jugulars.

199. *D. Progress, Termination, and Prognosis of Expansion of the Heart.*—The *progress* of dilatation entirely depends upon the nature of the pathological condition, or antecedent disease, of which it is a more or less immediate consequence. A slight degree of expansion, depending chiefly on original conformation, and accompanied with a delicate constitution and thin muscles, may subsist long, or remain stationary for years, without occasioning much disorder beyond dyspnœa, shortness of breath, and palpitations on exertion, or slight asthmatic disorder; but when dilatation is consequent upon a permanent or increasing obstacle to the circulation, or is associated with adhesions of the pericardium, the symptoms are more severe, more rapid in their progress, and attended with evidence of general cachexia. When dyspnœa becomes urgent, or œdema or dropsical effusions take place, or when pulsation of the jugulars is observed, the disease is generally rapid in its progress, especially if exasperated by exertion, mental disquiet, or attacks of fever, &c.; although judicious treatment, by repeatedly procuring the removal of effusions, will often prolong life a considerable time. Much, however, will depend upon the age, strength, constitution, and previous state of the patient. Upon the above considerations the prognosis must entirely depend.*

200. *E.* Treatment *of Dilatations of the Cavities and Orifices, with Attenuation of their Parietes.*—The *first object* is to ascertain the exciting or pathological cause of the dilatation, and to remove it as much as possible. When the cause consists of disease of the valves or orifices impeding the circulation, it is difficult, if not impossible, to effect this object, yet it ought not to be left unattempted; but when the cause is of a less permanent kind, as peripneumony, spinal curvatures, pertussis, asthma, bronchitis, hydrothorax, emphysema of the lungs, &c.; or when the dilatation has been produced by laborious occupations, constrained postures, strait lacing, playing on wind instruments, &c., this intention ought never to be overlooked; for, if the expansion have not proceeded so far as to

* [The signs and diagnosis of dilatation of the heart are most ably pointed out in Dr. Pennock's *Am. Edition of* Hope *on "the Diseases of the Heart and great Vessels,"* which the reader should consult. In addition to the symptoms above mentioned may be enumerated *discoloration of the face, congestion of the brain, injection of the mucous membrane, passive hæmorrhage, congestion and enlargement of the liver*, and *angina of the heart. Mitral regurgitation*, from dilatation of the left ventricle, is occasionally met with, which we have had an opportunity of observing this day, July 9th, 1845, in a patient of Dr. North's, at Saratoga Springs. A lady of about thirty years of age, labouring under general debility and cachexia from extreme cardiac dilatation, from some unknown cause swooned away, or fainted, and, on reviving, there was found to exist the most violent and rapid palpitation that I have ever witnessed. The whole left side of the chest was thrown into violent commotion, and the pulsation in the carotids was a tremulous wave, advancing and receding with astonishing rapidity, the number of pulsations that could be counted amounting to over 200 in a minute. These symptoms continued nearly two hours, and were at length relieved by vomiting, induced by a few grains of sulphate of zinc and ipecacuanha.]

deprive the muscular structure of the organ of its resiliency, a more or less complete restoration of the dilated cavity may be effected. Even when it is impossible to restore the organ to its healthy state, an increase of the dilatation may be prevented, and the patient's life may be prolonged to the usual limits.

201. The greatest attention should be paid to *diet* and *regimen*, as well as to the selection of *medicinal agents*; and both classes of means ought to be directed to the support of vital power. With this view, vegetable and mineral tonics may be prescribed, with aromatics, antispasmodics, and anodynes, according to circumstances. Small doses of quinine may be given with camphor and hyoscyamus, or of the sulphate of iron, or of the sulphate of zinc, with the extract of hop. Valerian, asafœtida, the compound galbanum pill, or the compound iron pill, may also be exhibited in similar forms of combination; or either of the alkaline solutions in use may be given with chalybeates, or with tonic infusions or decoctions. Where there is any obstacle to the circulation, referrible either to a morbid state of the lungs, or to diseased valves, the fixed alkalies, or the sub-borate of soda, with tonics, will be found of much service. If there exist pulmonary congestion, with copious and difficult expectoration, the decoction of *senega root*, with an aromatic water, and small doses of camphor, will be productive of benefit. If attacks of dyspnœa or of asthma take place, and if the dilatation be complicated with emphysema or with œdema of the lungs, this combination will be of use; or camphor, ammonia, asafœtida, ammoniacum, the æthers, &c., may be exhibited in forms which the peculiarities of the case will indicate. At the same time, the surface of the body should be kept warm, and derivatives applied to the extremities, fresh air being freely admitted into the patient's apartment.

[These cases of dyspnœa will often be most promptly relieved by the administration of a few grains of sulphate of zinc or ipecacuanha, or both combined; and the result may be explained either by the counter-impression thus made upon the mucous membrane of the stomach, or by the removal of some irritating cause in this organ, to which the impeded respiration is owing.]

202. The utmost attention ought always to be paid to the state of the digestive organs. The secretions and excretions should be promoted; those of the liver and bowels being freely evacuated by an occasional dose of the blue pill at night, and of a stomachic aperient the following morning. Flatulent distention of the stomach and bowels, and acidity, should be especially guarded against, and removed by the means suggested in the article Flatulency (§ 15, *et seq.*); for these states of disorder remarkably aggravate both functional and organic affections of the heart, as shown in the article just referred to (§ 8). The circulation ought to be kept tranquil by moral and physical quietude, and by a light, nutritious, but not heating diet. In order to preserve a free state of the cutaneous function, and to prevent catarrhal affections, flannel should be worn next the skin, and the feet kept warm by woollen stockings. Febrile and inflammatory affections, and particularly inflammations of the lungs and bronchi, as Dr. Hope very properly advises, should be sedulously guarded against, by adopting these and other means, and promptly treated when they occur. But even in these circumstances, I would add, blood-letting ought to be resorted to with extreme caution, and rarely or never by venæsection. In all cases of expansion of the cavities of the heart, the organ is unable to accommodate itself to large or sudden losses of blood, and hence a fatal collapse may be the result of the abstraction of this fluid. If the contingent pulmonary congestion should render vascular depletion an appropriate remedy, a small quantity only ought to be taken away, and always when the patient is in the recumbent posture, restoratives and external derivatives being also resorted to.

203. If the expansion has followed low or adynamic fevers, or has been caused by venereal excesses or masturbation, or by non-inflammatory softening or relaxation of the muscular structure of the organ, as in cachectic, chlorotic, or scorbutic constitutions, *tonics* are especially requisite; particularly the preparations of iron, the tincture of the muriate of iron, and chalybeate mineral springs; residence in a pure and dry air, and light, nourishing food. The vegetable tonics with the alkaline subcarbonates, or preferably with the vegetable or mineral acids, especially the muriatic, the nitro-muriatic, and the acetic, will also be of service, according to the state of antecedent and concomitant constitutional disease.

204. When *disease of the valves and orifices* of the heart, or any other obstacle to the circulation, of which dilatation is a consequence, has proceeded so far as to have also occasioned dropsical effusions, treatment is seldom productive of more than temporary benefit. The means which promise the greatest advantage, especially when effusion has taken place, are so fully stated in the article Dropsy (§ 45–47), that I need not particularize them at this place. If permanent dyspnœa, emphysema of the lungs, increased exudation into the bronchial tubes, and difficult expectoration, be associated with this state of cardiac disease, *expectorants*, especially the decoction of senega, the balsams, camphor, ammoniacum, &c., with opium, will be of service.

205. In addition to strict attention to *diet* and *regimen*—the former consisting chiefly of light animal food, in moderate quantity, and the more farinaceous vegetable substances, the latter of mental and bodily quietude—the patient should reside in a dry, bracing, temperate, and equable climate, and in large, well-ventilated apartments. He should observe early hours, and, as his health improves, take very gentle exercise in the open air. The cold or salt water bath, or the shower-bath, will also be of service, if directed with caution and discrimination. In this, as well as in all other affections of the heart, bulky, flatulent, and acescent vegetables should be avoided, and that kind of food preferred which is found to be most easy of digestion. Recourse may be had to chalybeate or other strengthening mineral waters as convalescence advances. Admitting it possible that *partial dilatation or aneurism of the cavities*, and that *dilatation of the orifices* of the heart may be detected during life—a circumstance not likely to occur, in respect of the

former lesion especially—the treatment will not vary from that which has been now recommended.

iii. Atrophy of the Heart. — *Cardiac Consumption.*

206. Charact.—*Diminished size or wasting of the heart, the actions of the organ being feeble, limited in extent, and attended by a weak and confined impulse, and by little or no dulness on percussion in the præcordia.*

207. *A.* The heart may be unusually small, *from original conformation or from disease.—a.* Many of the instances of extreme smallness of this organ on record are referrible to the former cause. Those adduced by Morgagni (*Ep.* lxx., 5), Lieutaud (vol. ii., obs. 453), Burns (*Op. cit.*, p. 110), Kreysig (b. ii., p. 468), Otto (*Compend. of Comp. Anat.*, p. 264), and others, are of this kind. The majority of those referred to by Lieutaud and Ploucquet (*Med. Digest.*, art. *Cor—parvum*), are stated so loosely by their respective authors as to be almost devoid of interest. Otto thinks that a disproportionate size of the heart to the whole body is sometimes hereditary; and that, when it is congenital, it is often connected with other vicious formations of the organ, or with general weakness and imperfect development. If a really small heart be fleshy, firm, and red, and its compartments in due proportion to one another, it may be considered as a vice of conformation.

208. *b. True atrophy*, or diminution of the heart from disease, is rarely observed in a remarkable degree. Slight grades of it are, however, not uncommon, especially in wasting diseases, as phthisis, mesenteric obstructions, and chorea, although the atrophy of this organ is not so considerable nor so rapid as in other muscles. Otto attributes this to the want of cellular tissue between the muscular fasciculi. Portal, Testa, and Kreysig suggest that the seeming diminution caused by the violent contraction of the organ at the time of death should not be confounded with atrophy of it. True atrophy is accompanied with attenuation, softness, or paleness, or hardening of the structure, or with a shrivelled or wrinkled appearance of the surface of the viscus. It may be so considerable as to reduce the organ to one half or one third its natural weight. M. Chomel found the heart not larger than a hen's egg in a man who died in the hospital *La Charité*. As respects its form: 1st. One or more of the compartments are attenuated without any change in their capacities, the heart being but slightly diminished in bulk; 2d. With attenuation there is much more rarely diminution of the capacities of the chambers, the organ being very much lessened in size; and, 3d. With diminution of the cavities, the parietes may be of the natural thickness, or even above it; this is the most frequent form of atrophy.

209. *B.* The *Causes* of atrophy of the heart are, 1st. *Local;* 2d. *Moral;* and, 3d. *Constitutional.—a.* Of the *first*, the most common are compression, arising from the pressure of matters effused into the pericardium, or from tumours developed in the mediastinum, and constriction or other changes of the coronary arteries, especially ossific deposites in their coats, &c. I doubt, however, the influence of compression from these causes, as the heart is very rarely found atrophied where the greatest amount of effusion has existed in the pericardium. In the case referred to below, where there obviously is extreme atrophy from local causes, the previous effusion never seemed to have been very great.*—*b.* The *moral causes* consist of mental anxiety, and all the depressing passions, particularly when their action has been prolonged.—*c.* The *general causes* are, whatever arrests the nutrition of muscular structures; and yet the heart seldom participates in the change of these parts, or only in a slight degree. In the diseases just mentioned (§ 208) more or less atrophy is sometimes met with, but it seldom bears any relation to the wasting of the voluntary muscles. In a case of tubercular consumption, in which death occurred instantaneously, before ulceration had commenced, and before emaciation had become considerable, the heart was small and flabby, and the parietes of the ventricles somewhat attenuated. The most marked cases of atrophy which I have seen were in persons who had died after attacks of chorea and chlorosis, and after hypochondriasis and distress of mind.

210. *C.* The *Symptoms* are seldom such as to indicate, with tolerable certainty, the existence of atrophy of the heart, unless it be very considerable. In this case, the impulse is weak, limited or small; the sounds are indistinct or faint, in proportion as the cavities are diminished in capacity; and there is little or no dulness on percussion. The pulse is small, thready, and often frequent; and there is commonly marasmus, and loss of colour. Yet emaciation can hardly be reckoned as a sign of atrophy, as it not infrequently accompanies hypertrophy of this organ.

211. *D.* The *Treatment* of this lesion should be directed, 1st, to the removal of the causes, as far as it can be accomplished; and, 2dly, to the restoration of the healthy nutrition of the organ. The latter of these intentions will be best accomplished by attention to the digestive and assimilative functions, and by the use of chalybeate medicines and mineral waters, with suitable exercise in a dry and temperate air; and the other means recommended for *function-*

* The following case is singular: A girl, at the age of seven years, was attacked with rheumatism of the joints of the upper extremities, with extension of the disease to the pericardium, the former affection subsiding partially as pericarditis was developed. The treatment mentioned in the *note* to par. 153 was prescribed, and the disease nearly disappeared. But the pericarditis returned on two subsequent occasions at considerable and irregular intervals; and, in the second and third attacks, the cartilages of the left ribs were pushed outward by the effusion into the pericardium. A mercurial treatment was prolonged; recovery seemed more complete, and the case was dismissed. About eight or nine months afterward, this child was brought to me with the lower half of the sternum and the cartilages of the left ribs, which were formerly protuberant, drawing backward towards the spine, so as to form a deep and large depression in this situation, and scarcely to leave sufficient space for an atrophied heart to lie between the spine and the depression. The epigastrium was drawn inward and upward on each contraction of the ventricles. In this case, which was seen also by some of my colleagues at the Middlesex Hospital, the repeated attacks of pericarditis had given rise to adhesions of the pericardium to the heart, and probably also to the pleura; to this atrophy had succeeded; and the sternum had been drawn inward with the wasted heart. This child was, even in this state, much recovered. She could take gentle exercise. The heart did not present any morbid sound at this period; but there was well-marked epigastric pulsation of a confused kind, probably owing to the pressure of the heart on the aorta. She was alive and able to be about when this was written.

al disorders (§ 50 53), for *softening* (§ 221), and for *dilatation* (§ 200) of the heart.

212. iv. Contractions of the Cavities and Orifices of the Heart.—*A.* Diminution of one or more of the *cavities* arises, 1st. From *concentric hypertrophy* of the parieties (§ 158); 2d. From *atrophy* of the heart (§ 208); 3d. From the pressure of tumours, or of effused fluids on one or more of the compartments of the organ; and, 4th. From concretions of lymph or of fibrin, recent or organized. The *first*, *second*, and *third* of these morbid states have received attention at the places referred to; the *fourth* will be fully considered hereafter. From whatever of these causes the diminished capacity of the cavities arises, it is evident that very serious phenomena will result as soon as this lesion becomes so great as to materially derange the circulation, especially venous congestions, and serous effusions and infiltrations. When the cavity of the left ventricle is diminished, the pulse is small, as in narrowing of the aortic orifice.

213. *B. Contraction of the orifices* of the heart may proceed from the same changes as produce diminution of the cavities; but it most frequently is a more or less immediate result of internal carditis, and attendant upon induration of the valves. As such it has already been considered, when treating of the chronic states of endocarditis (§ 66, 67).

214. *C.* The *Treatment* of diminished capacity of the *cavities* is rarely followed by any benefit. The changes producing it manifestly are beyond our resources. This remark is nearly applicable to contraction of the *orifices*. The means, however, which may be employed, should depend upon the cardiac lesions and the symptomatic changes consequent upon this alteration of the orifices and valves. If *hypertrophy* have become associated with it, the treatment advised in the chapter on this lesion (§ 182), according to the form it may assume, will be appropriate. If *expansion* of the cavities have taken place, the means prescribed under that head will be requisite (§ 200).

215. v. Of Alterations of the Colour and Consistence of the Heart.—*A.* The *colour* of the heart may vary, or be irregular, both on its surfaces and in its substance. One or more *white* specks, or patches, of different sizes, are often found. They are produced by a slight inflammation, causing thickening and opacity of the membrane, and are seated in either the internal or external surfaces. The structure and external surface of the organ are often *paler* than natural in cachectic, dropsical, and leucophlegmatic habits; and are sometimes of a *pale yellow* in these habits of body, and in hearts which are preternaturally fat. In inflammation, and in hypertrophy, this organ is *redder* than usual. In softening, suppuration, mortification, and other organic lesions, it is often spotted, of a *grayish*, *light*, or *dark brown*. Sometimes the internal surface, in one or all the cavities, is *reddened* throughout by the imbibition of the colouring matter of the blood; and a similar discoloration of the external surface has been observed to follow from the transudation of blood, and from hæmorrhage into the pericardium. Otto found the heart tinged with green in a case of poisoning with stramonium seeds.

216. *B. Alterations of consistence* have already been partially noticed (§ 113–115), but chiefly as consequences of inflammation.—*a. Softening* of the heart is not infrequently found in persons who have died of low fevers and malignant diseases, and it then occurs in the advanced stages of these maladies; but it is also met with under other circumstances. It presents two forms; one the result of inflammation (§ 113), generally with asthenic characters; the other seemingly in no way arising from inflammatory action, but rather from impaired organic nervous or vital power, and insufficient nutrition of the organ. In the former the softening is most commonly attended by a deeper tinge of colour or discoloration; and the substance of the heart is not wasted, or is even more bulky than natural; signs of antecedent inflammation being usually present either in the internal or in the external surface, or even in the substance of the organ itself. In the latter form the heart is paler, as well as softer than usual—is easily broken down—and frequently the cavities are somewhat dilated; but there is rarely any other distinct vice of structure. In a few extreme cases, the muscular fibres present a sort of fish-like structure, especially in young chlorotic and leucophlegmatic persons.

217. The non-inflammatory form of softening is met with chiefly under the circumstances just mentioned, and in fatal cases of scurvy, purpura, chorea, dropsy, and anæmia. In all these I have seen it, as well as in mesenteric decline and tubercular consumption. It is occasionally associated with an inordinate deposition of fat around the organ; this latter being generally attended by a relaxed, pale, softened, or atrophied state of the muscular structure of the heart. In persons who have died suddenly, and without any distinct cause, the heart is sometimes soft, flabby, and even bloodless. Cases of this kind are recorded by Mr. Chavalier, and by my friend Mr. Worthington (*Lond. Med. Reposit.*, vol. xvii., p. 361). An instance also recently occurred in my own practice. In the softened state of the heart found in low fevers, and in other contaminating diseases, there is also observed more or less dark discoloration of it. Violent exertion diminishes the vital cohesion of this organ, as well as of other muscles, deepens its colour, and causes it to be easily broken down. Senac and Otto found it very soft in hunted deer. This alteration is probably increased by the effect which an inordinate acceleration of the circulation produces upon the fibrin of the blood, as shown by Haller and others. (See art. Blood, § 134.)

218. *b.* The *Symptoms of softening* entirely depend upon the proximate cause. If it arise from inflammation, then it is generally attended by the signs and symptoms of an associated *endocarditis* or *pericarditis*. If it be accompanied with *dilatation*, more or less of the phenomena attendant upon that lesion may be expected. In its simple or non-inflammatory states, there are generally great langour and debility; a soft, quick, weak, feeble, and small pulse; frequent faintings; a sallow, pale, faded, or tallowy complexion; passive œdema of the extremities, and sometimes of the countenance; the sounds of the organ being dull and obscure, and

the impulse weak or nearly gone. As this lesion is often attended by effusion into the pericardium, the sounds and impulse will be farther obscured by this circumstance, and the sphere of dulness on percussion extended accordingly. When it is not thus associated, the faint sounds and impulse of the heart will not be attended by greater dulness on percussion than natural. (See, also, the sections on *Inflammations* (§ 121) and on *Dilatation* (§ 196).)

219. *c. Induration of the heart* is generally a remote consequence of inflammatory action (§ 119), and is more rarely observed than the opposite lesion. It is often simulated by an unusual contraction at the moment of dissolution. In hypertrophy, also, the heart is firmer than natural, but not to amount to a morbid induration, so as to afford great resistance to the scalpel, or to cause a crepitation on dividing it. Induration may occupy the whole of a ventricle, or only part of it; and it may accompany other lesions, or alterations of the organ as to size. It is evidently the consequence of altered nutrition, and is different from the firmness observed in hypertrophy, as well as from the cartilaginous and osseous hardening of portions of the organ sometimes consequent upon inflammatory action (§ 120).

220. *d.* Of the *Signs* and *Symptoms* of this lesion, nothing positive is known. Laennec supposed that, in its slighter grades, the impulse of the heart was increased; and Corvisart thought that, beyond a certain point, it rendered the contractions of the ventricles more difficult, and their movements more confined.

221. *e.* The *Treatment* of alterations of the consistence of the heart should be directed according to the evidence of these changes that may exist, and to the associated cardiac and symptomatic changes. In *softening*, we must depend chiefly upon the exhibition of tonics, especially quinine, cinchona, mineral acids, &c., or upon the tincture of the muriate, or the sulphate, or the other preparations of iron, pure air, and the means recommended for dilatation (§ 200). If it were possible to ascertain the presence of *induration* of the heart, but little could be hoped from medical means. Those advised for hypertrophy (§ 182) are, perhaps, the most appropriate.

[Perfect tranquillity of body and mind, with as much animal nutriment as the stomach can bear, are essential to the proper management of cardiac softening. Pure air is of no less importance; for we cannot look for the cessation of palpitation till anæmia is removed. We must employ such means as are calculated to restore the general tone of the muscular system, for, by so doing, we restore tone and elasticity to the heart. If dropsy has already set in, we should use tonics with our diuretics, as cascarilla, quinine, gentian, &c., and where there is a failure of the circulation, with a tendency to sinking, the diffusible stimulants, as wine, brandy, and æther, will be useful.]

222. vi. Of Serous and Sanguineous Infiltrations of the Heart.—*A. Infiltration of Serum into the Cellular Tissue of the Organ—Œdema of the Heart*, Bouillaud—is very rarely seen. This writer, however, describes it as follows: The cellulo-adipose tissue enveloping the viscus presents the form of a tremulous, gelatiniform mass; from which exudes, upon pressure, a liquid, transparent serum, which is sometimes colourless, and occasionally of a yellowish green tint. The cellular tissue which is thus infiltrated is of a dull white, or opaline hue, as if macerated by the contained fluid. This alteration may accompany other dropsical maladies, or cachectic states of the system; but it is referred by M. Bouillaud chiefly to a varicose state of the coronary veins, consequent on the difficult passage of the blood from them into the right auricle. Obliteration of some of the cardiac veins will occasion this lesion; but it has hitherto not been described.

223. *B.* The *Exudation* or *Infiltration of Blood* into the cellular tissue of the heart—*Cardiac Hæmorrhage*—has been also met with, but very rarely, and chiefly in the form of *petechiæ*, or small *ecchymoses*. One or two instances of a more copious hæmorrhage into the substance of the organ, so as to form a distinct hæmorrhagic cavity—*Apoplexy of the Heart*—have been recorded. *Petechiæ* and *ecchymoses*, principally on either of the surfaces of the organ, have been noticed by Stoll, Fairbairn, and Otto. I met with this alteration in a case of purpura hæmorrhagica, and in another of scurvy. In these diseases, and in the putro-adynamic states of fever, I believe that it is not very uncommon. Otto (*Comp. of Path. Anat.*, § 177, p. 278) states that he met with effusions of blood, in various parts of the heart, in a case of petechial fever; also in a person killed by fire-damp, and in a child who died of hooping-cough. In a case of violent inflammation of the heart, he found small extravasations of blood under the outer membrane. Dr. Fairbairn (*Trans. of Med. and Chirurg. Soc. of Edin.*, vol. ii., p. 157) observed effusions of blood under the inner membrane of the heart in a case of purpura; and Cruveilhier (*Anat. Path.*, livr. xxii., pl. 3) saw the same lesion in the substance of the left ventricle. The exudation and effusion of blood into the pericardium has received attention in the article Hæmorrhage (§ 276).*

224. vii. Of Fatty Degenerations and Obesity of the Heart.—*The fatty degeneration of the structure* of the organ is not to be confounded with an *excessive deposition of fat* between the pericardiac covering and the substance of the heart, frequently met with in corpulent persons.—*a. Excess of fat in this viscus* is often accompanied with a flabby, softened, and attenuated state of the parietes. In these cases the adipose substance often penetrates to some depth between the muscular fibres. The symptoms attending this state of the organ cannot be referred so much to the accumulation of fat—to *the obesity of the organ*—as to the change in the muscular parietes attending it; both alterations being results of weakened organic nervous energy, and of, consequently, impaired assimilation.

225. *b. The true greasy degeneration* is a trans-

* [Petechiæ and ecchymoses on the outer surface of the heart, as also sanguineous infiltrations in its substance, have been observed by Dr. Francis in several bodies dead by drinking cold water when over-heated, during the ardent heat of summer, in New-York, in the season of 1824 and 1825, as well as in subsequent years. In a case of sudden death by lightning, Dr. F. found the heart surcharged with blood under its outer covering, with exudation of blood and serum within the pericardium.]

formation of the muscular substance of the organ into a fatty matter similar to that first described by Haller and Vicq d'Azyr as occurring in the muscles. This lesion is generally confined to a portion of the parietes. Laennec and Andral met with it only at the apex. Dr. Hope found the greater part of both ventricles thus degenerated, the colour being that of withered leaves. More rarely, the substance of the heart has the appearance of lard, as remarked by Corvisart, Burns, Duncan, Cheyne, Luchett, and Chomel; the less altered portions in these cases are not only soft and flabby, but they also have an oily aspect.

226. *c.* Both these forms of fatty degeneration sometimes nearly approximate. M. Andral remarks that most frequently the muscular fibres are not really converted into fat, but are only atrophied by the excessive deposition of fat between them; yet, in some cases, they seem to have undergone this change, as they grease both paper and the scalpel, owing to an oily matter infiltrating them. That the atrophy of the muscular substance is not a mere consequence of the accumulation of fat, as Andral and others suppose, and that both changes are joint consequences of impaired vital power and imperfect assimilation, are satisfactorily shown by the circumstances under which they occur, by their being met with only where these primary pathological conditions exist, especially in aged persons, and by their having been found in connexion with an excessive quantity of oil in the blood; the increase of this fluid in the circulation being a manifest result of impaired assimilation. Mr. Smith (*Dub. Journ. of Med. Science*, vol. ix., p. 412) has detailed two cases in which this connexion was observed; and one recently fell under my own observation. In Mr. Smith's cases, globules of limpid oil floated on the surface of the blood; in my case, the serum was remarkably milky, from the quantity of fat it contained. From the history, and the alterations found on dissection, of two cases detailed by Dr. Duncan (*Edin. Med. and Surg. Journ.*, vol. xii., p. 65), and by Dr. Simeons (*Heidl. Kinisch. Ann.*, t. iii.), it appears that inflammation of the heart may terminate in the true fatty degeneration of the muscular substance of the organ.*

227. *d.* Of the *Signs of Obesity and Fatty Degeneration of the Heart* little can be stated with confidence. Many writers suppose that the accumulation of fat, together with the softening of the muscular substance, embarrasses the organ, and ultimately arrests its action. Boerhaave thus accounted for the sudden death of a person whose heart was found loaded with fat. Portal (*Anat. Med.*, t. iii., p. 75) believed that obesity of the heart produces palpitations, dyspnœa, asthmatic affections, and even sudden dissolution; and Bonet, Senac, and Fothergill entertained similar opinions. It has been also supposed that the softening and attenuation of the muscular substance attending the excessive deposition of fat in this organ dispose to *perforation* or *rupture* of it. Morgagni and Bouillaud have recorded cases which favour this view. In one of the two interesting instances adduced by Mr. Smith, the sudden death was owing to rupture of the left ventricle. Kreysig remarks that, more commonly, obesity of the heart gives rise to no symptoms by which its existence can be inferred during life. M. Chomel, however, thinks that it often occasions dyspnœa and palpitations, and very probably faintings or sinking; an irregular, weak, soft, small, and slow pulse; and anasarca, or œdema of the extremities, may also be produced by it.

[Dr. Hope supposes that an accumulation of fat about the heart leads to, 1st, diminution of the sounds; 2d, irregular pulse, without valvular disease; and, 3d, oppression, or even pain in the præcordial region, with general signs of a retarded circulation, producing cerebral, hepatic, and other congestions.]

* It may be interesting to subjoin the particulars of a few of the cases of this lesion which have been put upon record.

1. A young married woman was seized, ten days before coming under Dr. Duncan's care, with rigours, followed by great anguish and pain under the sternum, with jactitation, want of sleep, rheumatism of the joints, pleuritic pains in the chest, cough, expectoration, dyspnœa, inability to lie down, followed by œdema of the extremities, the pulse having become weak, soft, and small. The treatment was antiphlogistic for some time after her admission into the hospital (on the eleventh day of the disease), and subsequently palliative. She died six weeks after the attack. On *dissection*, the pericardium was found universally inflamed, and firmly adherent to the heart. The lungs were agglutinated to the pericardium and to the costal pleura. The heart was enlarged and thickly covered with coagulated lymph, by which the pericardium adhered to it. Under this lymph, about two thirds of the structure of the heart was changed into condensed fat, which melted, stained paper, and swam in water; the remaining third had almost lost its muscular appearance. The columnæ carneæ in both the ventricles were larger than natural. Ossific deposites were found in the aortic and mitral valves.

2. A gentleman aged sixty, who had experienced attacks of gout, and had lived fully, was struck with apoplexy, for which he was treated, by Dr. Cheyne, in the usual manner. His pulse, however, continued extremely unequal and irregular; dropsy supervened; and he died, some weeks afterward, of a recurrence of the apoplectic seizure with hemiplegia. On *dissection*, the heart was found greatly hypertrophied. The lower part of the right ventricle was converted into a soft, fatty substance; the upper part was remarkably thin, and gradually degenerated into this substance. The whole substance of the left ventricle, with the exception of the internal reticulated structure and columnæ carneæ, was converted into fat, the cavity being greatly enlarged. The valves were sound. The aorta was studded with steatomatous and earthy concretions. The principal peculiarity in the symptoms was the state of the respiration, which was irregular, and often suspended for a quarter of a minute.—(*Dublin Hosp. Reports*, vol. ii., p. 216.)

3. Mr. Adams (*Ibid.*, vol. iv., p. 396) has detailed the case of a man, aged sixty-eight, of a full habit of body, who was subject to cough, and frequent attacks of an apoplectic nature. His breathing was irregular, and his pulse about thirty in a minute. He died from an apoplectic attack. On *dissection*, the right auricle was much dilated. The right ventricle seemed composed of fat, of a deep yellow colour through most of its substance. The reticulated lining of the ventricle, which, here and there, allowed the fat to appear between its fibres, alone presented any appearance of muscular structure. The left ventricle was very thin, and its whole surface was covered with a layer of fat. Beneath this the muscular structure was not a line in thickness, and was soft, easily torn, and like liver. The septum of the ventricles presented the same appearance. In both ventricles, even in the lining fibres, yellow spots were seen, where fat had occupied the place of muscular structure. The whole organ was very light. The valves of the aorta were partially ossified.

4. A girl, during arthritic rheumatism, complained of various symptoms, many of which were referrible to the heart. Internal heat, with coldness of the surface, suppressed menstruation, cold perspirations, very feeble action of the heart, were complained of. Death took place after ten months. On *dissection*, the lungs were found adherent to the pericardium and costal pleura. Yellowish white filamentous adhesions existed between the heart and pericardium. Two thirds of the muscular substance of the organ were converted into a grayish yellow mass of fat. (Dr. Simeon's *Op. cit.*, Heidl., 1827.)—See, also, Dr. Elliotson *On Diseases of the Heart* (p. 32), and the two cases recorded by Mr Smith, in which free oil was seen in the blood; and in one of which, also, softening and rupture of the left ventricle were observed.

228. *e.* An excessive deposition of fat under the pericardium, according to M. Bizot, is much more frequent in *females* than in *males*. He found, in 35 of the latter, the heart very much loaded with fat in 4; but, in 42 of the former, it was equally charged in 23 cases. That the accumulation of fat around the heart is not necessarily connected with, nor dependant upon general obesity, is shown by the circumstance of 29 of the female cases having been thin or emaciated, and yet of these there were 14 instances of obesity of the heart. Of 13 females of a full habit, 9 presented an accumulation of fat around this organ. In 25 *phthisical females*, M. Bizot found a maximum deposition of fat in this situation in 11 cases, a medium quantity in 11, and complete absence of it in 3. In 11 phthisical men, this deposite was wanting in 6, and very scanty in 5. (*Mém. de la Soc. Méd. d'Observat.*, t. i., p. 351.) I have observed an unusual accumulation of fat around the heart most frequently in habitual drunkards.

229. *f.* A *morbid deposition of fat* has likewise been observed on *the external surface*, and between *the layers of the pericardium*; sometimes to the extent of producing an injurious pressure upon the heart and great vessels, and even sudden death. Instances of this change have been noticed by Bonet, Senac, Godart, Morgagni, Meckel, Testa, Parry, Black, Krevsig, and Horn. That this deposition is entirely independent of general obesity is confirmed by the remark of Otto, who states that he has met with it, although there was meagerness of other parts of the body. Fatty deposites on the pericardium have been incorrectly considered as causes of angina pectoris by Fothergill, Wall, and Schramm; they are only contingently associated with it, or with neuralgia of the heart, in rare instances.

230. *g.* The *Treatment* of this lesion, in cases where the above indications, conjoined with a leucophlegmatic and corpulent state of the frame, render its existence probable, consists in whatever will improve the digestive and assimilative functions and the organic nervous energy. Tonics, chalybeate preparations; iodine, or iodine with iron; stomachic aperients; regular exercise in a dry, open air; and abstinence from fat, oily, or rich articles of diet, and from stimulating beverages, especially spirituous and fermented liquors, constitute the chief means of cure, if, indeed, a cure be practicable.

231. viii. Of Adventitious Formations in the Heart and Pericardium.—*A. Of Earthy and Ossific Depositions*, little remains to be added to what has been already advanced, when considering them as occasional terminations of chronic inflammation (§ 119, 120). But calcareous phosphates are sometimes deposited in circumstances which are by no means conclusive of the presence of inflammatory action, particularly in aged persons, and when other consequences of this action are not observed. —*a.* In many cases, a whitish patch appears, either in the fine cellular tissue uniting the enveloping membrane to the heart, or between the reflections of the internal membrane composing the valves, increases in thickness, and assumes more and more the characters of cartilage, especially in the latter situation. The morbid secretion giving rise to this patch ultimately becomes the seat of osseous or earthy deposites. M. Andral divides the ossiform formations found in the heart into *three species*, as they are seated in the cellular, fibrous, or muscular tissue.—(*a*) That in the *cellular tissue* is the most common, the portion of it uniting the reflections of the internal membrane to the fibrous structure of the orifices and valves being most frequently thus altered. The calcareous phosphates are deposited in the cellular tissue in minute grains, or in considerable masses, separating and compressing the surrounding textures. They are more rarely met with in the tissue connecting the muscular fibres; and they there form either isolated masses, or are connected with the deposites formed around the orifices.—(*b*) The *fibrous tissue* frequently also becomes the seat of the osseous deposite, and chiefly in three points: 1st. In the tendinous zone encircling the left auriculo-ventricular orifice; 2d. In the fibrous structure of the valves; and, 3d. In the tendons of the mitral valve.—(*c*) The third species is the most rare. Indeed, it is doubtful whether the *muscular fibre* ever becomes the seat of this alteration. It seems more probable that the deposites in the connecting cellular tissue, by their bulk, compress or partially destroy the muscular structure, than that this structure is converted into bone. The rare instances on record, especially those adduced by Burns, Renauldin, and others above referred to (§ 119), are most probably merely proofs of the partial destruction of the muscular tissue in the seats of the excessive osseous or calcareous formations.

232. *b.* The *pericardium* very rarely presents patches of the cartilaginous and osseous transformations. Instances, however, of the former have been recorded by Boerhaave, Riolan, Hautesierk, Morgagni, Saviard, Otto, and Testa; and of the latter have been observed by Aurivillius, Saviard, Walter, Haller, Pasta, Senac, Prost, Rayer, Laennec, and Abercrombie, in the fibrous or in the serous layer. Fibro-cartilaginous and osseous concretions are still more rarely found loose in the cavity of the pericardium. They have been detected only by Lanzoni and Otto, and have probably had their origin in peduncular tumours which had subsequently been broken off.

233. *c. Signs.*—Laennec supposed that cartilaginous or osseous formations in the substance of the heart may be recognised, when very considerable, by an augmentation and modification of the sound. That a morbid sound will be heard when the orifices and valves are implicated, cannot be disputed; but the phenomena consequent upon these changes, when confined to the body of the organ, have not been observed with any precision. In a case noticed by M. Andral, the suppositions of Laennec were not confirmed. It is unnecessary to add that these lesions are altogether beyond the reach of *treatment*.

234. *B. Tubercular Formations* have been very rarely found in the muscular structure of the heart. M. Laennec met with only three or four cases, but Otto and Bouillaud never saw one. M. Andral remarks that the heart is one of the organs in which tuberculous deposites are most rarely observed. Instances, however, are recorded by Hildanus, Bonet, Morgagni, Portal, Autenrieth, Spens, Law-

rence, Bayle, Macmichael, and Elliotson, at the places referred to below. In a man aged thirty-four, who complained of pain in the chest, cough, inability to remain in the recumbent posture, and subsequently of irregularity of pulse and palpitations, hypertrophy of the left ventricle and tubercular formations in the muscular structure were found after death. (*Cat. of Prepar. in Museum Fort Pitt*, &c., p. 38.) In an aged man, who died of pulmonary consumption (*Dub. Med. Journ.*, 1836), a tubercular mass was found in the parietes of the left auricle obstructing the trunks of the pulmonary veins. M. Sauzier detected, in a man who died of tubercular disease of the lungs, pancreas, &c., tubercles in a crude state in the walls of the auricle, the pericardium being adherent in the situation where they existed. Most of the cases of this lesion on record have occurred in persons who were labouring under extensive tubercular disease of the lungs and other organs: many of them have not been observed with any degree of precision, and the anatomical descriptions have generally been very loosely given. Tuberculous productions have been found also in the internal surface of the *pericardium* by Musgrave, Haller, Voightel, Baillie, Otto, and others.

235. *C. Watery Cysts* and *Hydatids* have been detected both in the substance and on either of the surfaces of the heart.—*a.* Simple *cysts* have not infrequently been confounded with hydatids, the former having been described as instances of the latter formation, especially some of those mentioned by Bonet, Rutty, Morgagni, Huermann, Salzmann, Clossius, and others. Portal found several hydatids on the base of the heart; Meckel and Bernhardi, large hydatid sacs on the left ventricle; Price, a large single hydatid in the muscular substance, in a boy who died suddenly; Abercrombie, a bag containing two ounces of albuminous fluid on the left auricle; and Trotter, two hydatids within the right ventricle. It is, however, doubtful whether these were really cases of hydatids. From the imperfect account given of the most even of these, it may be inferred that some of them, at least, were merely instances of serous cysts. M. Andral remarks that these cysts vary from the size of a pea to that of a large hen's egg. They are most frequently found between the external surface of the heart and pericardium; but they are sometimes seen on the internal surface of one of the chambers. In other cases, they are not visible on either surface, and it is only on dividing the muscular structure that they are detected. M. Dupuytren saw a number of these cysts imbedded in the walls of the right auricle, and protruding a considerable way into its cavity. M. Andral found a cyst as large as a walnut in the walls of the left ventricle, which were slightly hypertrophied. In another case, he detected one on the free surface of the lining membrane of the right ventricle, attached to it by a delicate pedicle of the same texture as this membrane. Dr. Elliotson mentions a case in which a number of globular cysts, containing a bloody fluid, were attached by pedicles to the fleshy columns.

236. *b.* Instead of simple cysts, true hydatids have been found in the heart, but in extremely rare instances in the human subject; they are more frequently met with in this organ in the lower animals. M. Andral has often seen them in the hearts of measly pigs, and only once in the human heart. Otto saw them protruding into the right auricle in one case; and in a man who died of diseased testes, he detected "a heap of hydatids on the Eustachian valve, hanging by several threads into the right ventricle." These, however, were probably only a cluster of simple cysts. Mr. South states that at St. Thomas's Hospital, there is a heart with a cyst on its apex as large as a hen's egg, which was filled with hydatids. Watery cysts and hydatids have been found not only under that part of the pericardium reflected over the heart, but also either attached to the inner surface of the bag of the pericardium itself, or lodged between its layers.

237. *D. Tumours* of various kinds are noticed by the older writers as having been found in the substance of the heart; but, owing to their deficient anatomico-pathological knowledge, and to loose or defective descriptions, the exact nature of these is unknown. To these belong the cases recorded by Rhodius, Schenk, Columbus, and Bonet, and those collected by Lieutaud. Tumours of a *steatomatous* nature have been observed by Penada, Fleisch, Sprengel, and Otto; and others, of a *melicerous* and *gritty* kind, by Morgagni, Walter, Arndt, and Cruveilhier. Otto states that he has seen a fat, gritty tumour in the substance of the right ventricle of an old woman, and five or six encysted tumours, the size of hazelnuts, in the left ventricle of a young man. In an officer, who was the subject of chronic hepatitis, dropsy, &c., the slightest exertion producing severe palpitation, hurried and oppressed breathing, and a sharp, irregular pulse, the heart was enlarged, and presented a large encysted tumour on the right auricle, the aorta being ossified at several points. (*Catal. of Prepar. in Mus. Fort Pitt*, &c., p. 36.)

238. *E. Sarcomatous Formations*, and *Medullary Sarcoma* or *Encephaloid Productions*, have also been found in both the heart and pericardium. Otto remarks that *sarcoma* occurs, 1st, as single, little roundish knots, deposited between the layers of the valves; 2dly, as white condylomatous growths on the inner surface, and especially on the valves; and, 3dly, as spheroidal, smooth, tolerably large, and solid growths, or true sarcoms. The *first* is common; and instances of the *second* are recorded by Lancisi, Bonet, Morgagni, Sandifort, Testa, Laennec, Desruelles, &c. Corvisart, Scarpa, and some others, consider them of a syphilitic nature, while Bertin and Bouillaud controvert this opinion. Otto states that he has met with them large, grape-like, or in the form of a cock's comb or cauliflower, both in syphilitic and in other persons. Bouillaud views these formations as the consequences of modified states of chronic inflammatory action. The *third* variety is most rare. It has been observed in either surface, and in the substance of the heart, by Forlani, Blancard, Sommerring, Otto, Rigacci, Nasse, and others. Meckel found fifteen of these productions, from the size of a pin's head to that of a hazelnut, partly within and partly without the heart. Testa found them in the heart of a person long afflicted with syphilis. Mr. South states that, at St.

Thomas's Hospital, on the interior of the right auricle of the heart of a man, who had a sarcomatous growth in the nostrils, there were two similar productions, one as large as a bean, the other as a pea.

239. *F. Medullary Sarcoma*, or *Fungoid Disease*, in modified forms, may implicate the heart or pericardium, or both. As in the case of tuberculous deposites, it is observed principally in cases where this disease had previously appeared in other parts of the body. Bartzky found it on the anterior and upper part of the heart; Segalas d'Etchpare, in a boy; Cruveilhier, in an old man; Ollivier, and several authors quoted by Otto, in persons advanced in life. In all these there were similar tumours in other parts, and the muscular structure of the heart was chiefly affected. When this disease is seated in either the posterior or the anterior mediastinum, the pericardium may be penetrated by it, and the heart itself implicated. This was observed in the case of a woman whose arm had been amputated on account of this malady (Gerson and Julius, *Magaz. der Ausl. Liter. d. q. Heilk.*, September, 1823, p. 199). The pericardium was involved in it, in a case which lately fell under my observation. The disease was seated in the mediastinum, and extended not only to the pericardium, but also to the sternum and ribs, its nature being recognised during life. In a case published by M. Velpeau, encephaloid tumours were found in the substance of the heart, in the lungs, between the pleura and ribs, in the bronchial glands, under the mucous membrane of the stomach, in the duodenum, in the pancreas and right kidney, in the liver to the number of some hundreds, between the tunics of the gall-bladder, in different parts of the peritoneum, on the upper surface of the brain, in the thyroid gland, and under the skin, and in the muscles of the right thigh. The aorta also was completely obstructed by fungoid masses.

240. M. Andral twice saw this disease in the right side of the heart. In the first case the patient presented signs of hypertrophy of the left ventricle. In addition to this, almost the whole of the right ventricle and auricle were converted into a firm, dirty white substance, traversed by a number of reddish lines, and possessing all the characters of the encephaloid substance. The second case was that of a man of middle age, who had enjoyed good health till two years previously, when he became slightly asthmatic. He continued in this state for five or six months, when he was suddenly seized with the most excruciating pain, confined at first to the region of the heart, but soon extending over the left side of the thorax. His dyspnœa increased, and he had violent palpitations and vomiting. The pain abated after an hour, and the next day he was as usual. During the following year the dyspnœa increased, and the pain returned seven or eight times. He afterward became much emaciated, had a peculiar sallow tinge, and evening exacerbations of fever. The attacks of violent pain were now frequent, but of short continuance. He had also occasional attacks of palpitation, but there was no stethoscopic evidence of disease either in the heart or lungs. After some time he became œdematous, and died suddenly. The wall of the right ventricle was occupied by a large knotted tumour, extending from the apex to the base, projecting very much externally, and protruding internally into the ventricle. The encephaloid substance composing it was firm in some points, and soft and diffluent in others. (*Anat. Path.*, t. ii., p. 347.)

241. *G. True Scirrus and Carcinoma* of the heart are, according to Otto, still doubtful. Where the evidence of either has been most conclusive, there has also been scirrus or carcinoma of other parts. Open carcinoma of the heart can hardly exist, as death will take place before the disease can proceed to this stage. Most writers, especially foreign pathologists, have confounded true carcinoma with fungoid or encephaloid disease; and cases have been recorded as examples of the former, when they were really instances of the latter. Of this kind are the cases adduced by Laennec, Velpeau, Andral, Cruveilhier, Ollivier, &c. Bayle and Cayol never met with an instance of scirrus of the heart. I have seen scirrus in the lungs and *pericardium* in one case, and in the pleura and pericardium in another, scirrous and carcinomatous disease have long previously existed in other parts of the body. M. Billard found in an infant three days old, three tumours imbedded in the heart, possessing the characters of scirrus. I doubt, however, their being actually scirrus. M. Recamier observed the heart partially converted into a substance resembling the skin of bacon in a person who also had cancerous tumours in the lungs. Cases of a more doubtful description are recorded by Carcassone and Duchateau. Rullier states that he found cancer in the heart of a person who had this malady in other organs; and a similar instance is recorded in the *Révue Médicale* (t. i., 1824, p. 272).

242. *H. Melanosis* has also been found in the heart and pericardium; but in all the instances of this kind on record this production has existed also in other parts. As to the *Treatment* of adventitious productions in the heart, it is unnecessary to offer any remarks.

243. ix. Of Polypous Concretions in the Cavities of the Heart. — Bartoletti and Pisini were the first to impose the name of *polypi* on those concretions of lymph and fibrin which are sometimes found in the cavities of the heart and large vessels after death. Kerkring first contended that these concretions were different, in their nature and mode of formation, from polypi of the uterus and nasal fossæ, to which Bartoletti and Pisini had likened them. But with Kerkring originated the distinction of them into *false* and *true polypi*, the former consisting of a *post-mortem* coagulation of the fibrinous part of the blood, the latter presenting a consistent cellular or organized appearance, and being formed during the life of the patient. This distinction was first questioned by Morgagni, who denied the existence of true polypi of the heart, and in this opinion he was followed by Lieutaud, Pasta, and others. On the other hand, Manget, Malpighi, Pechlin, Peyer, F. Hoffmann, and Fantoni maintained that the polypous concretions found in the cavities of the heart were to be regarded as the more immediate cause of death, and not as having been formed at the time of death. The opinions of pathologists, however, remained long divided on this point, until Corvisart,

Testa, Burns, Bertin, Kreysig, Laennec, and others investigated it somewhat more closely, and ascertained that, although these concretions occasionally form about the time of death, or immediately afterward, there are others of a different kind, which are produced during the life of the patient, and occasion very severe symptoms referrible to the heart, but not of a kind which generally admit of a precise diagnosis.

244. *A. Of the Formation and Kinds of Cardiac Polypi.*—Polypous concretions are most frequently observed in the right cavities of the heart, and oftener in the auricles than in the ventricles. This is explained by the circumstances which favour their production, especially the stasis of the blood in the auricles, the state of the blood when it reaches the right auricle, and the extension of inflammatory action from the venous trunks. These three principal causes are especially concerned in the production of *three kinds* of concretions. In the heart as well as in the veins, and even in the arteries, the fibrinous parts of the blood may concrete, 1st, from a condition purely mechanical; 2dly, from an altered state of the blood itself, especially from the passage of morbid matter into it; and, 3dly, from inflammatory action. Each of these, as being especially concerned in the production of three varieties of cardiac polypi, requires a detailed consideration.

245. *a. Simple fibrinous concretions—the false polypi* of former writers—are frequently found in the right cavities of the heart, and sometimes extend into the vena cava and pulmonary artery. They are occasionally entangled in the columnæ carneæ; but they have no organized or intimate connexion with any part of the internal surface of the heart with which they are in contact. They consist of an unorganized accretion of the fibrinous and albuminous parts of the blood; are of a uniform colour, easily torn, and generally met with in patients who have died of chronic diseases, characterized frequently by a deficiency of the red particles of the blood, or, in cases of marasmus, great debility or cachexy, and which have been accompanied by obstacles to the circulation, as from disease of the valves and orifices of the heart. These concretions may commence during the last moments of existence, or immediately upon dissolution. In cases of mechanical obstacle to the circulation through either the heart or lungs, the fibrinous parts of the blood may concrete in the right side of the heart so as to prevent the continuance of its action. The same result may also follow the remora or stasis of blood in the right auricle and vena cava, consequent upon extreme depression of the powers of life, or upon prolonged syncope, &c., the concretion thus formed preventing the restoration of the heart's contractions. Under such circumstances, this variety of concretion may be the proximate cause of death, although formed so shortly before, especially in diseases of the heart, and during extreme vital prostration.

246. *b. Fibrinous concretions from the passage of morbid secretions into the blood.* During languid states of the circulation, or when the fibrinous parts of the blood are disposed to coagulate, the passage of pus, or of the more consistent morbid secretions into the veins, occasionally determines or gives occasion to this act, the morbid matter carried into the circulation being the nucleus around which the fibrin concretes, especially in the situations, as the right side of the heart most favourable to this occurrence. When a partial coagulation of fibrin is thus occasioned during the venous circulation, the concretions, at first small, often become entangled in the fleshy columns of the right side of the heart, and undergo changes arising, 1st, from the concentric deposition of additional layers of fibrin, as in the cavities of aneurisms; 2dly, from their age or duration; and, 3dly, from the effects they produce on the parts with which they are in contact.—(*a*) Upon dividing these concretions, the appearance of concentric layers of fibrin becomes manifest, and in the centre, either pus, or tuberculous matter, or a substance resembling a minute coagulum is observed.—(*b*) The colour and consistence of these concretions depend chiefly upon their age. In the more recent cases, they nearly resemble those already described, and are soft or easily torn. Those of longer duration are more evidently disposed into concentric layers, more firm and fibrous, and generally of a paler tint, but varying from a grayish colour to a grayish red or flesh-colour.—(*c*) When they are of considerable size, or of long duration, they appear to have compressed the fleshy columns in which they are entangled, and ultimately they become adherent, in one or more points, to the internal surface of the heart in more immediate contact with them. This adhesion is manifestly owing to the irritation they have occasioned in this surface, and at these points, and to the consequent exudation of lymph, by which they become agglutinated and more or less closely adherent.—(*d*) In this variety of concretion there are neither blood-vessels nor vascular connexions with the surface to which they become adherent: circumstances readily explained by the modes of their production and of their consecutive agglutination. At the same time, such adhesions are merely contingencies, and very frequently do not occur, especially in the more recent concretions. The form and size of these concretions also vary remarkably.

247. *c. Polypous Concretions consequent upon Internal Carditis.*—While the two preceding varieties of concretion are generally observed in the right side of the heart, that about to be considered is most frequently met with in the left, inflammation attacking this side of the organ oftener than the right (§ 65, 68). This variety varies much in size and in firmness. It may not much exceed the granulations or excrescences described above (§ 66), or it may be so large as to nearly fill one of the cavities. In its more recent state, it is generally amorphous, resembling concrete lymph, or the buffy coat of the blood, glutinous, and slightly adherent to some part of the internal surface, or of the fleshy columns or tendons of the valves. But, when it has been of considerable duration, it is more firm, fibrous, or cellulo-fibrous, in its structure, and more firmly adherent to the internal membrane, with which it seems as if continuous. In some cases, blood-vessels may be traced through this variety of concretion, and their communication with those of the heart's internal surface may be demonstrated.

When this form of concretion is of considerable size, there is every reason to suppose that it is not altogether, or even chiefly, formed of the lymph exuded from the inflamed internal surface, as the quantity of lymph thus effused cannot be more than will give rise to the granulations, excrescences, or vegetations already noticed (§ 66). But the lymph thus exuded, during a languid circulation, or states of the blood favouring coagulation, attracts and disposes the fibrin to concrete around it; and polypi of great size, sometimes disposed in layers, as the second variety, may thus be formed. The firmness and cohesion of these polypi vary considerably, but their cohesion has no reference to the intimate nature of their connexion with the heart's surface; for in some cases, where the polypus was very soft, vessels could easily be traced from the heart into it, and these so large as to admit of injection (Rigacci, in *Bullet. des Scien. Med.*, Sept., 1828; Bertin, *Traité des Mal. du Cœur*, &c., p. 448); while in other instances the polypus has been firm, intimately adherent to, and apparently forming a continuous structure with the surface of the heart, and yet the existence of blood-vessels was not apparent. That this variety of concretion originates in inflammatory irritation of some part of the internal surface of the heart, is proved by the history of the cases in which it has been met with, and by the appearances exhibited upon dissection. From the foregoing division and description of these productions, the diversity of opinions which has long existed as to their formation will be readily accounted for.

248. *B. Of the Signs of Cardiac Polypi.*—About the end of the last century, polypi of the heart were considered a frequent occurrence, and many of the disorders of respiration and circulation were attributed to them. J. J. Rousseau took a journey to Montpellier to be treated for this disease, and, according to M. Bouillaud, upon foot, which he could not, of course, have done if he had been the subject of it. It is evident that the symptoms will vary according to the situation, size, and origin of these formations—to the degree to which they extend into or fill up the cavities of either side of the organ. Malpighi, Senac, Sauvages, and Bursieri have entered very fully into the diagnosis of these concretions, but no reliance can be placed upon what they have adduced respecting it. Even the more recent observations of Laennec, Harty, and others have not much advanced our knowledge. M. Bouillaud remarks that it is necessary for them to have attained so great a size as to notably impede the circulation before they can be possibly recognised during life. They do not, however, equally impede the flow of blood through the cavities in all the situations in which they may be placed. The concretions which are attached to the valves, or to their tendons, the other circumstances being the same, cause the greatest interruption of the circulation. When they occupy the right cavities, as most frequently is the case, the blood is sent in diminished quantity to the lungs, and accumulates in the venous trunks, causing congestion of the liver, brain, abdominal viscera, &c.; effusions into shut cavities and cellular parts; and asphyxy from deficient aerification of the blood, if the supply of blood to the lungs be much lessened. When they form in the left side of the heart, the phenomena are, in some respects, the same; but congestion of the lungs is a necessary consequence, with dyspnœa, effusions into the bronchi, or substance of the lungs, &c.

249. According to Laennec, the sudden supervention of an anomalous, confused, and obscure pulsation, in a patient who previously had presented a regular action of the heart, should lead to the suspicion of a polypous concretion; and if this disturbance takes place on one side only, this indication is almost certain. M. Bouillaud considers that the concretions consequent upon internal or external carditis are indicated by tumultuous pulsations of the heart, with a dulness or obscurity of the attendant sounds, or with a simple, or hissing bellows sound; by oppression, dyspnœa, or orthopnœa, and extreme anxiety, followed by venous congestions, and leipothymia; and by coma, stertorous breathing, convulsive movements, an indistinct and very small pulse, and coldness of the extremities. When these phenomena are manifested in the course of an acute disease of the heart, particularly during internal carditis, in which there had previously been but little irregularity, and oppression of the respiration and circulation, the existence of a polypous concretion is very probable, and especially if the sounds of one or more of the cavities are much diminished or obscure. In chronic diseases of the heart, attended by habitual dyspnœa, the occurrence of an insupportable orthopnœa and anxiety, with obscuration of the sounds, restlessness, coldness, and lividity of the face and extremities, and occasionally vomiting, also indicate the formation of concretions, especially if these symptoms have supervened without an obvious cause; and in this case it is very probable that the concretions exist in the right cavities.

250. *C.* The *Prognosis* and *Treatment* of polypous concretions require but few remarks: the former is always extremely unfavourable. Indeed, it is doubtful whether recovery ever takes place from them, at least when the indications of their existence are tolerably conclusive. M. Bouillaud, however, takes a more favourable view of the issue of such cases, and thinks that the more recent, and those which are not of large size, may be dissolved. This writer and M. Legroux suppose that attempts should be made to *prevent* the formation of these concretions in diseases of the heart, both in those which consist chiefly of interrupted circulation and in inflammatory action. With this view they recommend small blood-lettings from time to time, and diluents. It is probable that the disposition of the fibrinous portions of the blood to concrete may be counteracted by the exhibition of mercurials, by the liquor potassæ, and the subcarbonates of the alkalies, and particularly by the sub-borate of soda. This last substance I have found the most certain in preventing the coagulation of fibrin, and in dissolving lymph; and it may, therefore, be prescribed with advantage, not only in the inflammatory diseases of the heart, but also where there is reason to suspect the formation of polypous concretions.

[We believe, with Dr. Hope, that excessive blood-letting, as well as the exhibition of digi-

talis and nauseants, have a powerful tendency, in advanced stages of organic disease of the heart, to favour the formation of polypous concretions in the cardiac cavities. Bouillaud and others have recommended frequent venæsection as one of the best means of preventing the formation of polypi; but no fact is better established than that, in dilatation of the heart, in softening, and in advanced stages of valvular disease, blood-letting will not only fail to prevent polypi, but will actually induce them, besides favouring the supervention of dropsy, exhausting the vital powers, and hastening the case to a fatal termination. If we wish to prevent polypus in advanced stages of cardiac disease, we should direct the patient to be kept perfectly tranquil and in the easiest position, so that the circulation may not become embarrassed from being hurried; to avoid nauseants and digitalis, and everything calculated to derange the stomach and destroy the appetite; we should, in particular, pay attention to the diet, which should be of easy digestion, and in very moderate quantities; the bowels are to be regulated by enemata, and the mind preserved in as cheerful a condition as possible.

Our curative means are extremely limited. Warm fomentations to the surface and the extremities, to diffuse the circulation, and prevent congestion in the heart and great vessels; the free admission of fresh air; stimulants, as ether, carb. ammonia, wine, &c.; and if paroxysms of congestion of the heart come on, indicated by a confused, irregular action of that organ, with a small, weak, irregular pulse, and suffocative dyspnœa, immersing the feet and legs in a hot mustard bath; these means, employed and repeated according to circumstances, embrace nearly everything of importance that can be brought to oppose this malady.]

251. x. Of Ruptures of the Heart.—*A. Seat and History of*, &c.—Rupture of the heart was first observed by Harvey. Lancisi and Morgagni showed that instances of sudden death were frequently owing to this cause. As examinations after death became more frequent, cases of this occurrence were more commonly met with; and at the present epoch of pathological research they are by no means rare. Morgagni (*Epist.* xxvii., 10) remarked that rupture of the left ventricle is more common than that of the right; and that this latter is more frequent than rupture of the auricles: this is confirmed by the particulars of the cases which have been since recorded. M. Ollivier states that, out of 49 instances, the rupture was seated in the left ventricle in 34; in the right ventricle in 8; in the left auricle in 2; and in the right auricle in 3; and that, in 2 cases, both ventricles presented several ruptures. The results are, however, different in respect of ruptures occasioned by external violence. In 11 instances of this description, the right cavities were torn in 8; and the left in 3. In these 11 cases the auricles were torn in 6.

252. In the above 49 instances of spontaneous rupture the apex was found to be its seat in 9, this lesion in the others being nearer the base of the organ. The directions of the lacerations were various; in some the laceration was transverse or oblique; in others it was longitudinal, or in the direction of the fibres, or of the axis of the organ. In certain cases it was extensive on the external surface, and very small internally. In other instances the reverse was observed. The laceration may occur obliquely through the parietes, and resemble a sinus, as remarked by Morgagni. It may even be incomplete, some of the stretched fibres still remaining and concreting the opposite edges (Rostan). It may also resemble the perforation made by a bullet. It may, moreover, involve only one or two of the muscular layers, without penetrating into the cavity; and it may be limited to a few fasciculi of fibres, or to the fleshy columns, or even to the valves. When there is no apparent alteration of the tissue at the place of rupture, it is difficult to determine whether or not it has taken place from within outward, or in the opposite direction. The most singular circumstance in the history of this lesion is the occasional occurrence of two or more lacerations, in different degrees, in the same heart. M. Ollivier, upon examining into the particulars of the most authentic cases, found eight in which there were several ruptures, either in the same ventricle or in both. M. Rostan detected two lacerations in the left ventricle; Morgagni, three in the same situation; Portal, the same number in the same place; Dr. Ashburner, two in the left ventricle, and one in the right. M. Blaud found two penetrating the ventricles, two involving only the superficial layer of the left, and one the external layer of the right ventricle; and M. Andral observed five in the left ventricle, and a perforation of the stomach in the same patient. Frequently, when the substance of the organ is torn, some of the fleshy columns corresponding to the rupture are also torn. In some instances the fleshy columns are alone torn, the parietes of the ventricles remaining entire. In this case the derangement of the circulation becomes extreme, especially if the tendinous cords attached to the free margin of the valves are ruptured (Ollivier). Instances of this kind are recorded by Corvisart, Laennec, Bertin, Adams, and others. Ruptures of the heart have been arranged as follows by Dezeimeris: 1st. Rupture from external violence. 2d. Spontaneous rupture without previous lesion of the tissues of the organ. 3d. Ruptures consequent upon dilatation. 4th. Ruptures with *probable*, but not with demonstrable lesion. 5th. Ruptures owing to softening of the heart. 6th. Ruptures from abscess; and, 7th. Ruptures caused by ulceration or perforation of the heart. M. Ollivier has adopted a somewhat similar plan to the foregoing in his treatise on this subject.

253. *a. Rupture of the Heart without previous Lesion*, or without demonstrable lesion, is comparatively rare. In the cases recorded by Ploucquet and Fischer the rupture was preceded by severe pain, continued or remittent, in the left shoulder and about the margin of the left shoulder-blade, and shooting down the arm and left side of the thorax, and attended by a sense of laceration, pressure, and anxiety at the præcordia and epigastrium, sometimes with numbness and prickings in the shoulder and arm. In other instances, as in those published by Portal, Baron, and Andral, death has occurred without any previous ailment excepting dyspnœa, which was observed only in the case recorded by Portal.

[Spontaneous rupture of the heart is so rare that neither Corvisart, Laennec, Bertin, nor Senac met with a single case of it, although their experience in cardiac diseases was very great. About sixty cases of it have, however, been recorded, of which thirty-four have been collected, in various publications by Dr. Hallowell.* In most of these instances, it is stated that the patients had been affected, for a greater or less length of time, with palpitations, and had experienced frequent attacks of lypothymia, or pain beneath the sternum, and tightness and weight about the chest. Death generally took place very suddenly, although Rostan relates a case where the patient is said to have lived fifteen years after the accident, and died at last of rupture in another part of the organ (section 265, note). In a few instances, several hours elapsed between the occurrence of the rupture and the death of the patient. When death occurs instantaneously, as it generally does, it is in consequence, not of the amount of blood effused, for this frequently does not exceed ten or twelve ounces, but of the pressure exercised upon the organ by the surrounding mass of blood, thus arresting its action, and stopping the supply of blood to the various parts of the system.]

254. *b. Rupture consequent upon Narrowing of the Orifices*, with or without hypertrophy or dilatation of the cavities of the heart, is a more frequent occurrence than the foregoing. Morgagni has adduced several instances in which the laceration was consecutive of alterations at the origin of the aorta. Haller has cited a similar case; and others have been recorded by Portal, Rostan, and Dezeimeris. In a case published by Chaussier, in which death occurred during a dispute, the aorta was found constricted at its origin by a cartilaginous tumour which surrounded it. There can be no doubt that an obstacle to the circulation at the heart's orifices will favour rupture of the cavity behind it; and that laceration may occur, although the parietes of the cavity are hypertrophied. Instances of this latter occurrence have been published by Morgagni, Rostan, and others. Morgagni supposed that, when the rupture is connected with hypertrophy, it takes place in that portion of the parietes which is the least thickened and resistant. But this is not always the case; for the rupture has been observed in the most hypertrophied part. M. Chomel supposes that, when this has occurred, the ventricle has been almost equally thickened and resistant throughout, and that the part torn, although the most hypertrophied, has been actually the weakest. If the sole cause of rupture were a distending force, or even the resistance furnished by the contents of the cavity to the contraction of its parietes in forcing the contents onward, then might the laceration take place in the weakest part; but the rupture does not always occur in this way; for it is reasonable to infer that the same circumstances as occasion increased action and consequent hypertrophy will sometimes produce laceration, when their increase is rapid, or the obstacle to the circulation through the cavities of the heart insurmountable; and that hence the muscular structure is torn by its own excessive action at the very part where the contraction is most energetic.

255. *c. Dilatation* of the cavities might at first appear more frequently connected with rupture than hypertrophy has been found to be, laceration of the parietes following the extreme or sudden dilatation of them; but this connexion has been even less frequently observed than the preceding. Instances of it have, however, been adduced by Morgagni, Martini, and Schæffer. Local or partial dilatation might also appear frequently to terminate in rupture of the dilated part; but this is also a rare termination, as the adhesion of the part to the pericardium, or the formation of fibrinous layers in the interior of the sac, prevents it from being so easily torn as it otherwise would be. M. Ollivier remarks that, of nineteen instances of local dilatation, rupture occurred only in the three cases recorded by Galeati, Penada, and Bignardi.

256. *d. That Rupture should be favoured or occasioned by partial or general Softening of the Substance of the Heart* will be readily conceded, and several cases are recorded in illustration of the occurrence. In all these the softening was great, although varied in its characters: in some it has been denominated *gangrenous*, particularly by the older writers; in others *apoplectic*, by Cruveilhier (*Anat. Path.*, fasc. iv.); and in others *gelatiniform*, or *senile*, by Blaud. Of the second of these varieties, instances have been adduced by Tengmalm, Corvisart, and Rochoux. M. Ollivier states that the thesis of this last writer contains several cases of this kind of rupture. Instances of the third variety of softening terminating in laceration are published, in the places referred to below, by Hazon and others. In a case by S. Frank, this alteration appears to have arisen from lesion of the *nervi vagi*; and in one by Hodgson, the softening and atrophy seem to have followed obliteration of the coronary arteries. Rupture has also been occasioned by the softening attendant upon fatty degeneration of the heart (§ 224). Morgagni, Schmucker, and Adams have recorded cases in which this form of softening had terminated in laceration.

[Dr. Hallowell describes a case of rupture from fatty degeneration of the heart (*Am. Jour. Med. Sci.*, vol. xvii., p. 86) in a woman 76 years of age. On opening the thorax, the pericardium was seen greatly distended, and presenting a black appearance. An incision being made into it, the heart was displayed surrounded by an enormous clot of black blood, weighing about ℥xii. Where the rupture took place, in the anterior face of the left ventricle, one fourth its length from the apex, there were two small linear openings, three or four lines in length, separated by an interval of three lines, and communicating with the cavity of the ventricle by a single opening. The thickness of the wall of the ventricle was but slightly diminished, rather less red than natural, and presenting a peculiar marbled appearance, exhibiting yellow streaks whose direction was parallel with that of the fleshy fibres of the heart. The substance of the heart, owing to fatty degeneration, exhibited a friability, when cut into thin slices, comparable to that of liver.—(*Loc. cit.*)]

257. *e. Abscess in, or Ulceration of the Muscular Structure of the Heart has also been found*

* [*Am. Jour. Med. Sciences*, vol. xviii., p. 74.]

to have terminated in Rupture.—In cases recorded by Morgagni, Portal, Brera, Langlade, and H. Cloquet, *ulceration* had partially penetrated the parietes of one of the cavities, the remaining layer being torn by the distention or resistance of the contents of the cavity. Instances of *abscess* of the structure of the organ recorded by Erdmann and Mott, and quoted by Dezeimeris, terminated in a similar manner to the foregoing, the termination admitting of the same explanation.

258. *f. The Rupture may be partial, or confined to one or more Layers, or muscular Fasciculi, or tendinous Cords of one or more Cavities*, as stated above, and as shown by Corvisart, and confirmed by Laennec, Bertin, Adams, and others. In the three cases recorded by Corvisart, the rupture appeared to have been occasioned by violent physical efforts. Bertin detected rupture of one of the fleshy columns of the right ventricle, and attributed it to violent fits of cough. Laennec found one of the tendinous cords attached to the free margin of the mitral valve torn across; and Dr. Cheyne met with another instance of rupture of one of these cords in a person affected with dilatation and hypertrophy of the left ventricle. Cases in which rupture of the *fleshy columns* and *tendinous cords* have occurred have likewise been observed by Bouillaud, Townsend, and others.

[Dr. Maclagan relates a case of death, in a recent number of the *Edinburgh Journal*, caused by *rupture of some of the superficial fibres of the heart*. The patient, aged seventy-five, while seated with her family in the middle of the day, was observed to become suddenly pale, and, before assistance could be given, fell from her chair. She was seen in about a quarter of an hour; the features were pale and sharpened; the extremities cold and pulseless; she was, however, sensible, and able to articulate correctly. She swallowed, also, without difficulty, though with disinclination; but there was no restoration of the pulse or of the natural temperature of the extremities. She continued in a state of restlessness and occasional jactitation, but without apparent pain, and expired in about an hour from the period of the seizure, the breathing throughout having been nearly natural.

The body was examined forty-six hours after death. On exposing the pericardium, it was found to be much distended with fluid; on opening it, eight ounces of fluid blood and ʒiv. of coagula were removed. Two lacerations were found in the walls of the heart; one close to the septum cordis, upon the anterior aspect of the left ventricle, about an inch and a half above the apex of the heart; the other, which was smaller, was situated higher up, and was so shallow as to appear to be merely a fissure of the serous membrane. The larger laceration communicated with one of the coronary veins, and this appeared to be the source of the hæmorrhage, as it did not reach into the ventricle. The patient's death appeared to be owing rather to the mechanical obstruction to the heart's action than to loss of blood. The heart itself was above the normal size, without being hypertrophied; it was loaded with fat, and its substance was apparently slightly softened. —(*Med. Times*, July 2, 1845.)]

259. *g. Ruptures of the Valves* are not infrequently met with as a consequence of fragility arising from induration and ossincation, or from softening caused by inflammatory action; but previous disease is not always necessary to the production of this rupture, especially when it is produced by external violence, or by sudden and violent physical efforts. When, however, it is consequent upon slighter grades of these causes, or upon mental emotions, previous disease of the valves, or of the orifices, or of the internal surface of the heart may be inferred; otherwise they would have been inadequate to its production. If the rupture of the valve be partial, the patient may live a considerable time afterward; but extensive chronic disease will be the result, owing to the local irritation, and to the imperfect function of the valve, particularly farther structural change of the ruptured valve, dilatation, or dilatation with hypertrophy of the chambers of the heart, &c. When the rupture is extensive, and has been favoured by existing structural change, death either follows almost instantly, or takes place in a short time. When the rupture is partial, the patient may live for a considerable time, with the symptoms of insufficiency of the valves (◊ 76, 198).

260. *F. Rupture of the Heart from external Violence* is not a rare occurrence. Contrary to what is observed in respect of spontaneous rupture, the laceration occasioned by external force is more frequently seated in the right than in the left side of the organ, and much more commonly in the auricles than in the ventricles. As M. Dezeimeris has argued, it is very probable that the mode in which the rupture is produced by external injury depends much upon the nature and seat of the injury. When the region of the heart, or the thorax, is the seat of the external violence, the rupture takes place in the cavities possessed of the weakest parietes, and in the most yielding points of these; but when the injury is of a kind to prevent the heart from evacuating its contents, as in the case of a carriage-wheel passing over the trunk, or of any heavy body pressing upon the aorta, the muscular efforts of the ventricles to expel their contents may occasion either a partial or complete rupture of them, or of the vessel at some point between the heart and the part pressed upon.

261. *B.* The *Causes of Rupture of the Heart*, especially the most material, and those connected with the pathological states of the organ, have been already stated and explained under distinct categories. There are, however, various other causes which determine aid, or accelerate these in their operation. Violent mental emotions, particularly anger, fright, terror, unexpected disappointments, distressing intelligence suddenly communicated, anxiety, &c.; sudden and violent muscular efforts, and laborious or prolonged physical exertions of any kind, particularly in constrained positions. The act of coition and straining at stool have often occasioned rupture, a very large proportion of the cases of it on record having been attributed to these causes. M. Ollivier states that rupture of the heart occurs more frequently in men than in women; but this is not satisfactorily determined. It is certainly more common in persons far advanced in life than in the young. M. Blaud considers the rupture that takes place in old age as generally the conse-

quence of softening of the heart. Several cases recorded by him and by other writers confirm this; and those adduced by Cruveilhier and Smith farther show that softening terminating in rupture of the left ventricle is often accompanied, in old persons, with great accumulation of fat on the surface of the organ.

[It has been stated that, with the exception of several cases in children not well authenticated, all the subjects who died of this disease were over 58 years of age. Of 23 cases collected by Dr. Hallowell, in which the age is stated, 9 were between 70 and 80; 6 between 60 and 70; 5 between 50 and 60; 2 between 40 and 50, and 1 between 20 and 30; and of 34 cases, 16 were males, and 18 females.—(*Loc. cit.*)]

262. *C. Symptoms and Diagnosis.—a.* The cases hitherto recorded throw but little light on the diagnosis of this lesion. Some of these have furnished proofs of disease of the heart for a longer or shorter time; while others, up to the hour of death, had complained of no symptom indicative of any affection of the heart or large vessels. In the instances recorded by Ploucquet, Olmi, Charpentier, and Fischer, the patients complained, for a short time before death, of a violent pain in the left shoulder, extending to the arm, and occasionally to the whole side; attended, especially at last, with more or less numbness, and characterized by exacerbations and slight remissions. In some cases, inexpressible anxiety and pain have been felt in the præcordia and epigastrium, with cold extremities and cramps, shortly before dissolution. In the majority, rupture has produced instant death; but in some this has not been the case. In the instance adduced by J. Frank, life was prolonged twelve hours, probably from a coagulum filling up the laceration for a time. In a case recorded by Rust, the rupture was produced by the passage of a carriage-wheel over the chest, and was seated in the right auricle; yet the patient survived fourteen hours.

263. In most of the cases in which the rupture is preceded by violent pain, M. Ollivier thinks that it is produced gradually, from the successive laceration of several layers or fasciculi of muscular fibres, and that the pericardium becomes only gradually distended by the effused blood. Where the laceration and aperture are at once large, a copious effusion instantly occurs, fills the pericardium, and abolishes the contractions of the organ.

264. *b.* When the rupture is seated in the *partitions between the auricles or ventricles*, a fatal result may not very rapidly occur. In this case, the venous may be mixed with the arterial blood, although this may take place only to a small extent.—*c.* In the three cases of *rupture of the fleshy columns* detailed by Corvisart, a sudden oppression and sense of impending suffocation were the first symptom complained of. The pulse became unequal, irregular, and intermittent, and the pulsations of the heart confused. This state of distress and anxiety may continue for some days before it terminates in death; or it may endure much longer, and be accompanied with various signs of organic disease of the heart.—*d. Rupture of the valves* will necessarily be attended by much irregularity or disorder of the circulation, and by a simple, or hissing, or musical bellows sound (Bouillaud, Farrall).

265. As the *diagnosis* of rupture of the fleshy columns and valves of the heart, in the present state of our knowledge, is very imperfect, and as the signs of rupture of the parietes of one of the cavities are equivocal, nothing can be adduced as to the *Treatment* of these lesions. Indeed, in most instances, medical interference will be quite unavailing, and even as much mischief as benefit may result from it.*

[When rupture of the heart occurs, it is, for the most part, in the left ventricle, in its anterior wall near its middle. In 31 cases collected by Dr. Hallowell, there were 3 ruptures of the right auricle, none of the left, 2 of the right ventricle, and the remaining 26 of the left ventricle.]

266. xi. Alterations of the Blood-vessels of the Heart. The coronary vessels are more or less enlarged in hypertrophy of the heart, and diminished in atrophy. Some writers have supposed that the smallness of the vessels in the latter lesion is actually the cause of it; but the state of the vessels is solely dependant upon the nutrition of the organ. Portal (*Anat. Med.*, t. iii., p. 74) found the coronary veins dilated and varicose; and the larger trunks have contained polypous concretions (Kreysig). The coronary trunks, both veins and arteries, are always very much, and progressively enlarged with the accession of age, as shown by M. Bizot. The most common alterations, however, of the cardiac vessels are cartilaginous and ossific formations in the *arteries*. These, especially the ossific deposition, may consist merely of small isolated patches, or they may nearly or altogether surround the vessel. Ossification may extend along the greater part of an artery, or to two or more. Generally, the canal of the vessels is uninterrupted, although the parietes have become quite inert. Cases, however, have occurred in which the canal has been obliterated. Instances of extensive ossification of the cardiac arteries have been recorded by Parry, Ring, Portal, Hodgson, and others, and have been usually found associated with softening, flaccidity, or some other change in the nutrition of the organ. Angina pectoris has been supposed to depend upon this change; but numerous instances of ossification of the coronary arteries have been met with without this complaint, or, indeed, any symptoms referrible to the heart having existed.

267. xii. Communication between the Sides of the Heart.—This lesion is most frequently congenital, or the result of malformation, or

* The only instance on record showing the possibility of recovery, more or less partial, from rupture of the heart, has been published by Rostan; but some mistake may have existed as to the morbid appearances. The case is, however, very interesting. A woman had experienced, fifteen years previously to death, a violent pain in the præcordia and epigastrium, extending to the back, and returning at intervals. She was afterward subject to palpitations, followed by syncope. Her death was sudden. The pericardium contained blood effused in its posterior part, but was adherent to the heart anteriorly by several albuminous layers. On removing it, an irregular rupture, an inch and a half in length, and quite recent, was found; but, to the left of this, and at a distance of six lines, the substance of the organ was destroyed, and replaced by a fibrinous concretion, entirely similar to those found in aneurismal sacs, and intimately connected with the structure of the heart. The ventricle was thinned in this situation. The latter appearance was attributed to a rupture which had taken place at a long bygone period.

imperfect development of the organ. It occasionally increases suddenly about the period of puberty. M. Bertin (p. 436) and M. Bouillaud (t. ii., p. 564), however, believe that it is not unfrequently a consequence of ulcerative perforation; while M. Louis maintains that it very rarely arises from this latter cause. The communication may exist through the interauricular, or through the interventricular partition, or through both at the same time. Bouillaud remarks that, in many cases, the *opening in the interauricular partition* is a persistent state of the *foramen ovale;* but, in others, that it is consequent upon ulceration, particularly when it occupies a situation different from that in which the oval foramen is always found, and when there are more than one perforation. The communication in this situation is generally by a rounded opening, with smooth, sometimes thick and tendinous margins, commonly of from four to six lines in diameter, but sometimes of nearly double this size. The *perforation of the interventricular partition* is found in various situations, but most frequently at the junction with the partition of the auricles, and towards the insertions of the pulmonary artery and of the aorta. The form of the openings is commonly round, and the diameter is the same as those of the interauricular partition, the margins presenting the same polished and fibrous appearance.

268. The state of the valves and orifices of the heart, in cases of communication between the opposite cavities, is important. Of fifteen cases detailed by Bouillaud, the valves were indurated, thickened, corroded, or perforated in twelve; and in ten of these twelve, the orifices to which these valves belonged were more or less contracted. In eight of the twelve cases, these lesions affected the right; in three, the left valves and orifices. In five of the eight cases they were seated in the pulmonary valves; in two, in the tricuspid valve; and in one in both the pulmonary and tricuspid. Of fifty-three cases of cyanosis noticed by M. Gintrac, similar lesions to the above were found in twenty-seven; and in all these latter they were seated in the right side of the organ; twenty-six being at the orifice of the pulmonary artery, and one only in the auriculo-ventricular orifice. The contractions of the orifices and lesions of the valves, in these cases, did not differ from those described above (§ 67, 213). The greater frequency of the narrowing of the right orifices, particularly that of the pulmonary artery, in cases of communication between the opposite cavities, is deserving notice. This lesion M. Louis considers to be congenital. M. Bouillaud believes it to be, in some cases, caused by inflammatory action.

269. In eleven of the fifteen cases given by M. Bouillaud, the heart was enlarged, dilatation, with hypertrophy, having existed in the right side. Dilatation of the right auricle was observed in ten cases; and in most of these the parietes of the auricle were also thickened. Hypertrophy of the right ventricle was met with in ten cases; and in four of these the hypertrophy was concentric. The left side of the heart presented nothing abnormal, excepting the induration of the valves and narrowing of the orifices, in the three already noticed (§ 268). In the twenty cases reported by M. Louis, nearly the same appearances as in those of M. Bouillaud were observed. Dilatation of the right auricle existed in nineteen, six times with hypertrophy, and twice with thinning of its parietes. Dilatation of the right ventricle was observed in ten, hypertrophy in eleven, and both dilatation and hypertrophy in five instances; while, on the left side, dilatation of the auricle occurred thrice, that of the ventricle four times; and hypertrophy of the former twice, and that of the latter thrice only. (See Blue Disease, § 8.)

270. In some instances, communication between the opposite sides of the heart is associated with other *lesions of malformation;* as the connexion of the aorta with the right ventricle (Ribes), or with both ventricles (Louis), the persistence of the arterial canal, &c. (See Blue Disease, § 8.) The state of the *pericardium* has been noticed in a few only of the cases of this description; and in these, alterations depending upon chronic pericarditis, and effusion of a serous fluid, were chiefly observed.

271. The *symptoms* of the lesion under consideration are generally equivocal; for, as it is generally associated with disease of the valves and orifices, and with dilatation and hypertrophy of the corresponding chambers of the organ, it becomes difficult to separate the phenomena actually depending upon these lesions from those arising from the communication between the opposite cavities. The palpitations, dulness on percussion of the præcordial region, the purring tremour, the bellows or saw sound, the faintings, sinkings, oppression, &c., the irregularity and smallness of the pulse, the venous and serous congestions, &c., observed in these cases, are manifestly owing to these associated lesions. That more or less admixture of the venous and arterial blood results in consequence of the communication, must be admitted. M. Louis thinks that it takes place chiefly on the entrance of the blood into the communicating cavities, and on the departure of the blood from these cavities, when the natural orifice is more or less constricted.

272. Blue discoloration of the skin (see Blue Disease) has been attributed to this communication; but it is not always observed, and it is rarely universal. Sometimes it is not remarked, even in the countenance, till the last period of the patient's life. This change of colour is to be attributed as much to the obstacle to the circulation of the venous blood, as to the communication between the opposite sides of the organ; and this communication has generally existed a considerable time before the health has been very remarkably affected. The symptoms assigned to this alteration, particularly blue discoloration, leipothymia, great sensibility to cold, oppression and suffocation in the thorax, are chiefly an aggravation of those observed in other diseases of the heart, and are often wanting in this. According to M. Louis, the symptom most to be depended upon is, a sense of suffocation, occurring sometimes periodically, but always frequently, accompanied or followed by leipothymia, and with or without blueness of the skin, and occasioned by the slightest causes. Admixture of the red and dark blood, even to a considerable extent, at least in appearance, seems not incompatible with a tolerably prolonged existence, nor with development

of the intellectual faculties. It has no manifest effect upon intercurrent diseases. The existence of a communication between both sides of the heart, even when it becomes somewhat manifest, is not so dangerous as the blue disease. The former may not give rise to serious phenomena; the latter indicates that the communication is accompanied with a dangerous interruption of the circulation through the right side of the heart, or some equally dangerous lesion. As to the *treatment* of this alteration, I cannot add anything to what I have stated in the *article* Blue Disease (§ 12).

[Corvisart was one of the first to call attention to the fact, now well established, that cyanosis, though often found associated with an open state of the foramen ovale, may yet exist without this imperfection; the blue colour being often manifested in early life, while no communication has been traced between the opposite sides of the heart. Crampton has also related cases where there was a free opening between both auricles and ventricles, which must have subsisted for years, and yet in which there was no cyanosis. M. Ribes gives an instance of a man, 60 years of age, in whom the auricles communicated without there being any change in the colour of the skin. Dr. Francis very properly alludes to the blueness of the skin in cholera asphyxia, death from lightning, drinking cold water, inebriation, &c., as illustrating the influence of obstructed circulation in the lungs, and through the heart, on the vascular system (*Appendix to* Stewart's *Billard*, p. 703). "All these examples," he observes, "may be cited to demonstrate a cyanose state influencing a stagnation in the capillary system. In short, in the advanced stage of various affections, accompanied with a disordered circulation, we may often become the observers of this cerulean discoloration."]

273. VI. Displacement and preternatural Positions of the Heart.—The situation of the heart is sometimes anormal, owing to *malformation*; but my limits will not admit of an account of the various alterations of the *position*, and of the *form* of the organ, observed as a *congenital vice*. Those who are desirous of obtaining information on this subject will find it in the works of Haller, Meckel, Otto, Breschet, Bouillaud, and others, referred to at the end of this article. The *position* of the heart may be anormal in several ways, from malformation; it may be placed externally to the thoracic parietes, or internally in the abdominal cavity, below the diaphragm, or in the right side of the thorax; and the vice in situation may be associated with other anomalies, either in the circulating system, or in the position and form of the adjoining viscera, or in both. These, however, are matters calculated rather to excite curious speculation than to lead to practical inferences. But with *true displacements* of the heart, or *alterations of position after birth*, the case is different. These displacements arise from diseases, or injury of the organ itself, or of adjoining parts; and the extent of the alteration, and the manner or mode of its occurrence, in such cases, are matters of real practical importance.

274. *a*. The apex of the heart may be turned altogether to the *left side*, without farther alteration of position, or it may be raised at the same time somewhat higher in the thorax by excessive hypertrophy of the organ.—*b*. The heart may be *pushed downward* by an aneurism of the arch of the aorta, or by some other tumour pressing upon it. Cases of this kind have been noticed by Lancisi, Morgagni, and Otto.—*c*. True *prolapse*, or dragging down of the organ, from increased weight and weakness of the parts supporting it, is very rare; but it has been noticed by Leidenfrost, Senac, Zuliani, Pachioni, Otto, and Testa. In this form of displacement, the diaphragm is carried before the heart, a convex tumour thereby invading the abdomen.—*d*. The heart may be pressed *unusually high* in the thorax, or towards the neck, by enlargement of the abdominal viscera, by large hydatid cysts, by inordinate distention of the stomach or colon, by excessive dropsical effusion into the peritoneum, by tumours of the spleen, liver, or other parts, and by aneurism of the descending aorta. Instances of these occurrences have been adduced by the writers referred to hereafter. One of the most common causes of this displacement is aneurism of the descending thoracic, or of the abdominal aorta. In such cases, a double pulsation is felt in the aneurismal tumour, as in those recorded by Drs. Graves and Stokes.

275. *e*. The heart is not unfrequently *pushed over to the right side* by various alterations in adjoining viscera. It must, however, be recollected that this organ may be situated towards the right side, owing to original conformation, or to transposition of some or of the whole of the viscera. Instances of this are, however, very rare; but several have been adduced by the writers mentioned above (§ 273, 274). The alterations causing the displacement of the heart to the right side are, destruction or condensation of the right, and hypertrophy of the left lung, as in the case recorded by Dr. Abercrombie; dropsical effusion into, or encysted dropsy of the left thorax; pneuma-thorax of the left side; collections of pus or of blood in the left pleural cavity; tumours of various kinds; diaphragmatic herniæ; and curvatures of the spine. Dr. Stokes mentions a case in which the heart was thrust by a blow of a wheel to the right side, where it continued long afterward to pulsate.

276. Several instances of displacement of the heart to the right thorax have been observed by me. In all these it arose from the effusion of fluids of various kinds in the left pleural cavity: in one case, from the effusion of blood from external injury, with fracture of the ribs; in three, from pleuritis of the left side, terminating in serous effusion; in two, from empyema; and in two, from pneumo-thorax. In one of these latter, consequent upon tubercles, the patient had not been long ailing. The passage of air into the left pleural cavity was sudden and rapid. I saw him within two hours from the commencement of the distress consequent upon it, and immediately detected the pulsation of the heart on the right side.

Bibliog. and Refer.—i. Hypertrophy of the Heart.—*Diemerbroeck*, Anat., L. ii., c. vi.—*Lieutaud*, vol. ii., p. 129–146.—*Bartholinus*, Histor. Anat., cent. i., *Hist.* xxxii., 50.—*Haller*, Opusc. Pathol. Obs., 21.—*Morgagni*, Ep., xvii., 21; xviii., 28; liii., 9.—*Wildberg*, in Abhandl. der Erlanger Phys. Med. Soc., i., No. 16.—*Chambert*, in Journ. de Méd., cont. July, 1810, p. 5.—*Plowcquet*, Repertor. Art. Cor. Magnum.—*Reuss*, Repertor. Comment., vol. x., p. 92; vol. xii., p. 304.—*Fritze*, in Horn's Archives f.

Prakt. Medic., vol. iii., p. 298. — *Boeck*, de Statu Quodam Cordis abnormi., 8vo. Berol., 1818. — *Vetter*, Aphorismen aus der Pathol. Anatomie, p. 99. — *Bertin* — *Legallois*, in Bulletin de la Faculté de Méd. de Paris, ann. xiii., p. 69. — *Lallemand*, in Arch. Génér. de Médic., Aug., 1824. — *Bouillaud*, in Arch. genér. de Méd., vol. v., p. 373. — *Pultney*, in Philos. Transac., vol. li., 2. — *J. Copland*, Influence of Hypert. of the Heart on Apoplexy; in Lond. Med. Repos., vol. xx., p. 17, 1822.—*J. Johnson*, in Med. and Chirurg. Review, No. 48, p. 407. — *Rousseau*, in Recueil de Mémoires de Méd. Chir. et Pharm. milit., par *Fournier*, vol. x., p. 366. — *Andral*, Anat. Pathol., vol. ii., p. 284, 285.—*Lecheverel*, in Recueil Period., vol. xii., p. 41. — *Beime*, in Journ. de Méd., vol. xlii., p. 410. — *Conradi*, in Arnemann Magazin., b. i., p. 86.—*Walter*, in Nouveaux Mémoires de l'Académie à Berlin, 1785, p. 59.—*Seiler*, in Horn. N. Archiv., b. ii., p. 211.—*Hufeland*, Journ. de Pract. Heilkunde, b. xiii., st. iii., p. 74; and xviii. b., iii. st., p. 88. — *Jahn*, in Hufeland Journ. der pr. Heilkunde, b. xxiii., st. iii., p. 81.

ii. Dilatation of the Heart. — *Lancisius*, De Motu Cordis et Aneurysmatibus, fol. Rom., 1728. — *Meckel*, in Mém. de l'Académie de Berlin, 1750, p. 163; et 1756, p. 46. —*Senac*, Traité du Cœur., &c., l. vi., p. 485. — *Piderit*, Practische Annalen., i. st., p. 108. — *Matani*, De Aneurysmaticis Prescordiorum Morbis. Francof., 1766. — *Hiesinger*, Histor. Hydropis Pectoris cum Aneurysmate Cordis. Viennæ, 1770. — *Michaelis*, Aneurysmatum Cordis Disquisitio Anatom. Med. Observat. quâdam Illustrata. Halæ, 1785.—*Lombardini*, De Aneurysmaticis Præconliorum Morbis. Pavie, 1787. — *Portal*, Cours d'Anatomié Méd., vol. iii., p. 92; and vol. v., p. 52.—*A. Ramsay*, Anatomy of the Heart, Cranium, and Brain, 2d ed. Edin., 1803.—*Lesage*, Sur les Aneurysmes du Cœur et des gros Vaisseaux, 4to. Paris, 1803. — *Baillie*, Morbid Anatomy and series of Engravings, p. 15, pl. 3, fig. 1. — *Corvisart*, p. 269, Obs. 42.— *Renauldin*, in *Corvisart*, Journ. de Méd., vol. xi., p. 255. — *Fleury*, in Bulletin de la Facult., &c., l'an. 13. —*Flormann*, de Aneur. Cordis., pt. i.–iv., 4to. 1822. — Mem. du Mus. d'Hist. Natur., 1818, vol. iv., p. 62. — *Rostan*, in l'Asthma des Vieillards, est il une Affection Nerveuse? 8vo. Paris, 1818. — *Foderé*, in Journ. compl. du Dict. des Sc. Médic., vol. viii., p. 5.—*S. D. Reuss*, Repert. Comment., vol. x., p. 92; vol. xv., p. 200.—*Pierquin*, in Journ. des Progres., &c., vol. xiii., p. 255.—*Everest*, De Cordis Aneurysmate. Edin., 1822. — *Otto*, in Selt. Beobacht, part i., p. 86; et Pathol. Anat., by *South*, p. 265.—*J. F. Meckel*, Tab. Anat. Pathol., Fasc. i., Tab. 3, 4, and 6. — *Dundas*, in Transact. of Med. and Chirurg. Soc., vol. i.—*Portal*, in Mém du Mus. d'Histoire Nat., 1818, vol. iv., p. 62.—*Morizio*, De Aneurysmatibus internis. Padone, 1825.—*H. B. Smitz*, De Aneurysmate Cordis, 4to. Gandavi, 1827.—*Andral*, Anat. Path., t. ii., p. 282.—*Bouillaud*, in Nouv. Journ. de Méd., 1829; et in Op. cit., t. ii., p. 59.—*Virag*, De Aneurysmate Cordis. Pesth., 1830.—*Cruveilhier*, Anat. Pathologique, liv. xvii., p. 4.

iii. True Aneurism of the Heart.—*Galeati*, De Bonon., &c., et Art. Instit. atque Acad. Comment., t. iv., p. 26, 1757.—*Walter*, Nouv. Mém. de l'Acad. de Berlin, p. 55, tab. 4, 1785. — *Corvisart*, Op. cit., Paris, 1811. Obs. 42, p. 269. — *Zannini*, Anat. Pathol. di *M. Baillie*, t. i., p. 27. — *Berard*, Sur Quelques Points d'Anat. Path., &c. Paris, 1826; et Archives Génér., &c., t. x., p. 364. — *Adams*, in Dub. Hos. Reports, vol. iv., p. 353.—*Bignardi*, Annali. Univers. di Med. Malano., Jan., 1829, et in Archives Génér., &c., t. xix., p. 438.—*Dezeimeris*, in Archives, &c., t. xxi., p. 343.—*Ollivier*, in Dict. de Med., 2d ed., art. *Cœur Aneurisme vrai.*—*Breschet*, Sur l'Aneurysme Faux consecutif du Cœur, &c., in Repert. Génér. d'Anat. Phys. Path., t. iii., p. 183. — *Biett*, La Maladie de Talma, &c., in Ibid., t. iii., pt. i., p. 214.—*M. Boas*, De Cordis Aneurismate rarissimo, 8vo. Berol., 1826.—*C. R Bernhardi*, Observ. circa ingentem Cordis Tumorem. 8vo. Regiomonti, 1826 (*In the right auricle*).—*J. Johnson's* Med. Chir. Rev., vol. vi., p. 466, et vol. xi., p. 252.—*Reynaud*, in Jour. Hebdom. de Médec., t. ii., p. 363, 1829.—*Elliotson*, Op. cit., p. 29.—Catalogue of the Prepar., &c., in the Museum of the Army Med. Depart., &c., 8vo. Lond., 1833, p. 39 (*two instances*).—*Cruveilhier*, in Nouv. Biblioth. Méd., April, 1827; et Anat. Pathol., liv. xxi., pl. iv. (*In the left ventricle*), et liv. xxii., pl. 3.—*Bouillaud*, Op. cit., t. ii., p. 530.—*Otto*, Compend. of Pathol. Anatomy, by *South*, p. 266 (*Three specimens in Museum of St. Thomas's Hosp.*).

iv. Atrophy of the Heart.—*Schenck*, Observ., l. ii., p. 272.—*Zacutus Lusitanus*, Prax. Admir., l. i., Obs. 132.—*Kerkring*, Spicil. Anat., p. 43. — Mem. de l'Acad. des Sciences de Paris, 1712. —*Lieutaud*, vol. ii., p. 147, Obs. 453. —*Morgagni*, Ep. xvii., p. 12; Ep. lxx., p. 5.—*Chavasse*, in Lond. Med. Journ., 1786, p. 409.—*Meckel*, Mém. de l'Acad. des Sciences. Berlin, 1755, p. 62.—*Kreysig*, vol. ii., part ii., p. 468, &c.; vol. iii., p. 124. — *Wedemeyer*, in *Rust's* Mag. f. d. ges. Heilk., vol. xiii., p. 190. — *Camerarius*, Memorab., cent. xx., n. 63.—*Biermayer*, Mus. Anat. Pathol., No. 381. — *Tiedemann's* Zoolog., vol. ii., p. 571. — *Otto*, in Verseich., 2186–2189; et Comp. of Path. Anat., p. 263. — *Vetter*, Aphorismen aus der Pathol. Anatomie, p. 101. — *Brera*, Della Stenocardia, Malattia Volgarmente Conosciuta sotte il nome di Angina Pectoris. Verona, 1810.—*Testa*, p. 148 and 255.—*Telesius*, De Rer. Nat., l. v., c. 28.—*Portal*, vol. iii., p. 88.—*Kingston*, in Johnson's Journal, July, 1837, p. 27. — *Chomel*, in Dict. de Méd., 2d ed., t. viii., p. 316.—*Bouillaud*, Op. cit., t. ii., p. 463.

v. Alterations of the Orifices and Valves.—*Lancisius*, de subit. Morte, p. 121. — *Bartholinus*, Hist. Anat., cent. ii., Hist. 45.—*Bonet*, Sepulch., l. ii., sect. xi., obs. 26. —*Boerhaave*, Prælect ad Institut., l. v., sect. 478.—*Haller*, Elementa Physiolog. addenda, p. 129.—*Morgagni*, Ep. xxiv., 16, 17; and xxvii., 2. —*Lieutaud*, vol. ii., Obs. 575–595. — *Senac*, Op. cit., l. iv., c. 10. — *Ploucquet*, Repert. Arts. *Cord. Palpitatio* et *Valvularum vitia.* — *Meckel*, in Mém. de l'Acad. de Ber., 1756, p. 49. — *V. Malacarne*, Discorso sulla Litiasi delle Valvule del Cuore, 8vo. Torino, 1787.— *Van Heekeren*, De Osteogenesi Præturnaturali. Lug. Bat., 1797, p. 120.—*Soemmering's* Additions to *Baillie's* Morbid Anatomy, p. 26, note 49. — *Vetter*, Aphorismen aus der Pathol. Anat., p. 100, sect. 112.—*Corvisart*, Op. cit., p. 210. —*Seiler*, in *Horn's* Neuem. Archiv. f. Med. Urfahr., vol. ii., part ii. — *Hering*, De Osteogenesi Valvular. Cordis, 4to. Lips., 1819.—*Nevin*, in Medical Commentaries by *Duncan*, Dec. ii., vol. ix., No. 10, p. 325. — *Horn*, in his Archiv. f. Prakt. Medecin., vol. iv., p. 296. — *Young*, in Journal of Sciences and the Arts, No. 1, p. 49.—*Hall Jackson*, in *Corvisart's* Journal de Méd. et Chir., vol. xix., p. 468.—*Cerutti*, Beschreibung der Pathol. Präparate, p. 113, No. 590.—*Faber*, in *Hufeland's* Journal, 1827, Aug., p. 79. — *Testa*, p. 321.—*Louis*, Op. cit., p. 298 and 318.—*Otto's* Selt. Beob., part i., p. 99; and Verzeichn., Nos. 2223–2235, 3937, 3938; and Comp. of Path. Anat., p. 285. — *Vesling*, Obs. Anat. et Epist. Med., 15.—*Tilling*, in *Hufeland's* Journ., vol. xv., p. 156. — *Konig*, in *Horn's* Archiv. f. Medic. Erfahr., 1825; March and April, p. 292.—*Hodgson*, on the Diseases of Arteries and Veins, p. 67. — *Cumming*, in Dublin Hosp. Reports, vol. iii., p. 319. — *Gerson* and *Julius*, Mag. d'Ausl. Litt. d. ges. Heilk., Jan. and Feb., 1828, p. 198. — *Ephem. Nat. Cur.*, dec. ii., ann. x., obs. 175. — *Abernethy*, in Med. Chir. Transact., vol. i., p. 27.—*Corvisart*, Sur les Maladies, &c., du Cœur, p. 204, f. f. — *Kreysig*, vol. ii., part ii., p. 583–615. — *Elliotson*, Op. cit., p. 19. See, also, the works of *Hope*, *Bouillaud*, &c.

vi. Fatty Degeneration of the Heart.—*Diemerbroeck*, Anat., l. ii., c. 6.— *Schurig*, Hæmatalogia, p. 401. —*Morgagni*, Ep. iii., 20; xvi., 36; xxvii., 2; xxxv., 16; xliii., 17; lii., 34. — *Lieutaud*, vol. ii., p. 150.— *Senac*, Op. cit., l. iv., cap. 4, 9.—*Meckel*, in Mém. de l'Acad. de Berlin, 1756, p. 59. — *Bergen*, in Actis Soc. Med. Havn., vol. i., p. 247.—*Pyl*, Aufsätze und Beobachtungen aus der Gerichtl. Arzneiwissenschaft, vol. vii., p. 106.—*Portal*, Cours d'Anatomie Médicale, vol. iii., p. 74.—*Testa*, p. 342.—*Fothergill*, in Lond. Medic. Obs. and Inquiries, vol. v., p. 233.—*Corvisart*, p. 197. — *Laennec*, vol. ii., p. 295. — *Schramm*, Comm. Pathol. de Angina Pectoris. Lips., 1822, p. 17. — *Wedemeyer*, in *Rust's* Mag., vol. xix., p. 246, 269. — *Duncan*, in Edinburgh Medical and Surgical Journal, January, 1816, No. xlvi., i.— *Cruveilhier*, Essai sur l'Anat. Pathol., P. i., p. 183.—*Chardel*, Monographie des Dégénérations skirrheuses de l'Estomac, 8vo. Paris, 1806.—*Cheyne*, in Dublin Hospital Reports and Communications, vol. ii., p. 216. — *Simcons*, in Arch. Gén. de Méd., vol. xviii., p. 427.—*Laennec*, De l'Auscultation médiate, vol. ii., p. 298.— N. Auserl. Abhandl. zu Gebranche f. Prakt. Aerzte., vol. iv., p. 4.—*C. Zum Tobel*, Singularis Casus Degenerationis adiposæ Cordis, cum aliis vicinarum Partium Mutationibus conjunctæ, 8vo. Tubing., 1825. — *Otto*, Path. Anat., p. 289, et Verzeichn, No. 2236, 2237. — *R. W. Smith*, in Dublin Journ., July, 1836, vol. ix., p. 411.

vii. Adventitious Productions in the Heart. — *Columbus*, De Re Anatomica, l. xv., p. 489, 492.—*Rhodius*, Observ. Medic., cent. iii., ob. 4.—*Zacutus Lusitanus*, Med. Princ. Hist., l. ii., n. 41.— *Blancard*, Anat. Rar., cent. i., obs. 75, p. 158.—*Schenck*, Obs., l. ii., No. 203.—*Bartholin*, cent. ii., Hist. 32.— *F. Von Hilden*, Obs. Chirurg., cent. i., ob. 51.—*Gantius* in *Bonet*, Sepulchretum Anat., l. ii., sect. i., Addit. Obs. ii.— *W. Rutty*, Philosoph. Trans., 1728, p. 562. — *Lancisi*, de Mort. subitan, ob. iv., p. 161.—*Bonet*, l. ii., sect. vii., obs. 56, 132, addit. obs. 9, sect. viii., ob. 34; l. iii., sect. xxi., add. ob. 60; et sect. xxxvii., ob. 4; l. iv., sect. i., ob. 15.—*Pyl*, Aufsätze und Beobachtungen, vol. vi., p. 78. — *Lieutaud*, vol. ii., obs. 544–553. — *Penada*, Saggio secondo d'Osservazioni e Memorie Medico-Anatomiche, 4to. Padua, 1800.—*Forlani*, Obs. Rarior. Med. Pract., dec. i., p. 70; dec. ii., p. 10.—*J. F. Meckel*, Tab. Anat. Pathol., Fasc. i., vol. i., tab. 8. — *Walter*, in Mém. de l'Acad. de Berlin, 1785, p. 65, tab. 4, fig. 2.—*Trotter*, in Med. and Chym. Essays. Lond., 1796.—Eph. Nat. Cur., dec. i., ann. ii., 1761, obs. 5, p. 6.—*Lüdersen*, De Hydatidibus, Gött, 1808, p. 11. —*Fleisch*, in d. Allg. Annalen, 1811, Jul., p. 645.—*Morgagni*, Ep. xxi., 4; ep. xxv., 15; ep. xi., 11.—*Spangenberg*, in *Horn's* Archiv., 1811, July, p. i.—*Heuermann*, Physiologie, vol. i., p. 202.—*Salzmann*, in *Haller's* Disputat., vol. iv., p. 248. — *Clossius*, in *Baldinger's* Magazin., vol. x., p. 543. — *Portal*, Cours d'Anat. Médic., vol. iii., p. 29, 74.—*Testa*, p. 64, 67, 277, 278.—*Dupuytren*, in *Corvisart's* Journ. de Méd., vol. v., p. 139. — *Soemmering*, Addit. to *Baillie*, p. 21.—*D Price*, in Lond. Med. Chir. Transact., vol. xi., p. ii., 1821.

—*Arndt*, de Tumoribus Cord tunicatis, 4to. Ber. 1817.—*Pelletan*, Mémoires et Obs., iii., n. 3.—*Beauchamp*, in Recueil Periodique de la Société de Méd., n. xxviii.—*Cruveilhier*, vol. i., p. 301.—*Andral* and *Bayle*, in Révue Médicale franç. et étrangère. Février, 1821.—*Macmichael*, in Lond. Med. and Phys. Journ., August, p. 239. 1826.—*Wedemeyer*, in *Rust's* Magazin, b. xix., P. ii., p. 239.—*Autenreith*, in Tubinger Blätter, vol. i., P. ii., p. 191.—*Otto*, Selt. Beobach., part i., p. 98; part ii., p. 58; and Path. Anat., p. 288.—*Spens*, in Edinb. Med. and Surg. Journ., 1816, vol. xii., p. 194.—*Lawrence*, in Med. Chir. Transact., vol. iii., p. 78.—*Laennec*, vol. ii., p. 325 and 334.—*Sandifort*, Obs. Anat. Path., l. i., c. i., p. 31; l. iii., c. i., p. 41.—*Costallat*, in Journ. Hebdom., vol. iii., p. 10.—*Corvisart*, p. 223.—*Bertin*, in Bulletin de la Faculté de Médec., 1812, p. 58.—*Elliotson*, Op. cit., p. 22.—*Bertin*, Traité des Maladies du Cœur, p. 232.—*Testa*, p. 314.—*Desruelles*, in Revue Médic. Histor. et Philos., vol. iv., p. 305. Paris, 1821.—*Cruveilhier*, Anat. Path., l. xix., p. i., pl. 4.

viii. Medullary Fungus and Carcinoma of the Heart.—*Carcassone*, in Hist. et Mém. de la Soc. Roy. de Médic., 1777 and 1778; Hist., p. 252, ann. 1786; Hist., p. 320.—*Bartzky*, Obs. singularis Fungi medullaris in Corde; præf. *Dzondi*, 8vo. Halæ, 1821.—*Hodgson*, in *Savenko*, Tentamen Anat. Pathol. de Melanosi, 4to. Petropoli, 1825.—*Segalas d'Etchepare*, in Revue Médic., 1825, vol. iv., p. 247.—*Ibid.*, in Nouv. Bullet. des Sc. par la Soc. Philom., May, 1825.—*Gerson* und *Julius*, Magazin d. Ausl. Litter. d. ges., Heilk., p. 199, Sep. and Oct., 1823.—*Staupa*, Anweisung zur Gerichtlichen u. Path. Untersuchung Men. Leichname, p. 164, 8vo. Wien, 1827.—*Duchateau*, in Jour. de Médec., p. 243, Oct., 1810.—*Rullier*, in Bulletin de la Fac. et de la Soc. de Médec. de Paris, No. 5, p. 367, 1813; and in Journ. de Médec. Chir. et Pharm., vol. xxvii., 1813.—*Dupuytren*, in *Cruveilhier*, vol. ii., p. 87.—*Andral* and *Bayle*, in Revue Méd., Feb., 1824.—*Recamier*, in Ibid., Nov., 1825.—*Ollivier*, De la Moelle Epinière et de ses Malad., p. 262, 8vo. Paris, 1824.—*Velpeau*, Exposition d'un cas remarquable de Malad. Cancere, &c., 8vo. Paris, 1825.—*Churchill*, in Lond. Med. and Phys. Journ., March, 1827.

ix. Organic Lesions of the Pericardium.—*Hilscher* et *Schmiedel*, De Exulceratione Pericardii et Cor. Exemplo illus. Jenæ, 1742.—*Lieutaud*, Hist. Anat. Med., 4to, p. 210.—*Meckel*, Mém de Berlin, 1756, vol. xii., p. 31.—*Boerhaave*, vol. ix., p. 498.—*Haller*, Add. ad Elem. Phys., p. 128.—*Saviard*, in Journ. des Savans, 1691; Obs. Chir., i., lv., p. 25.—*Aurivillius*, in Nov. Act. Upsal., vol. i., p. 101.—*Morgagni*, De Sed. et Caus. Morbor., ep. xviii., p. 34; xx., 20, 35; xxii., 10; xliii., 17; xlv., 16; liii., 20.—*Stoll*, Rat. Med., vii., p. 172.—*Van Doeveren*, Specim. Obs. Acad., cap. v.—*Senac*, De Corde, l. vi., cap. ii.—*Stoerck*, Annus Medicus, ii., p. 92.—*Chambon de Montaux*, Markw. Krankengeschichten und Leichenberichte. Leipz., 1791.—*Biermayer*, Mus. Anat. Pathol., No. 434.—*Portal*, Cours d'Anat. Méd., iii., p. 24.—*Riolanus*, Anthropographia, l. iii., p. 12.—*Hautesierk*, Recueil d'Obs., vol. ii., p. 583.—*Testa*, Peterb. Vermischte Abhandl. a. d. Gebiete der Heilk., 1 ste. Samml., p. 232. 1821.—*Walter*, Obs. Anat., p. 63, and Anat. Mus., vol. i., p. 148, 149, 297.—*Pasta*, Ep. de Cordis Polypo, p. 75.—*Prost*, Médecine éclairée par l'Ouverture des Corps, i., p. 140.—*Abercrombie*, in Trans. of Med. Chirurg. Soc. of Edinb., vol. i.—*Rust's* Magazin, f. d. ges Heilk., vol. xvi., P. i., p. 185.—*Rayer*, in Archiv. Génér. de Méd., March and April, 1823.—*Rochoux*, in Journ. Gén. de Méd. et Chir., vol. xxix., Feb., 1814. Bulletin., p. 33.—*Bidois, fils*, in Archiv. Génér. de Médec., Dec., 1823. (*See, also, Bibliog. and Refer. to* Pericarditis.)

x. Adventitious Productions in the Pericardium.—*Musgrave*, in Philos. Trans., 1685, p. 860.—*Lancisi*, De Aneurism, l. i., 5.—*Haller*, Op. Minora, vol. iii., p. 365.—*Meckel*, Mém. de l'Acad. de Berlin, 1756, p. 79.—*Godart*, in Journ. de Médec., 1761, May, vol. xiv., p. 401.—*Boneti*, Sepulchret. Anat., lib. ii., sect. 2, obs. 16; sect. 8, obs. 6; lib. iii., sect. 21, obs. 21; and sect. 37, obs. 3.—*Morgagni*, Epist. xix., 7.—*Bourru*, in Hist. de l'Acad. de Paris, 1763, p. 35.—*Voigtel*, Path. Anat., lib. ii., p. 220.—*Heuermann*, Physiologie, vol. i., p. 202.—*Lieutaud*, Hist. Anat. Med., vol. ii., p. 271.—*C. Bell*, System of Dissection, &c., Edinb., fol., 1798.—*Steinbach*, De Tænia Hydatigena, 1802, p. 5.—*J. V. Bergen*, in Act. Soc. Med. Havn., vol. i., p. 247.—*Parry*, Inquiry into the Symptoms and Causes of the Syncope Anginosa. Lond., 1801.—*Zacutus*, Prax. adm., lib. ii., obs. 137.—*Black*, in Mem. of the Med. Soc. of London, vol. vi., p. 45.—*Fothergill*, Med. Obs. and Inquiries, vol. v., p. 246.—*Horn*, in Archiv. f. d. Med. Erfahr., vol. iii., P. i., p. 58.—*Kreysig*, vol. iii, p. 124.—*Schramm*, Comm. Pathol. de Angina Pectoris, p. 17, &c.—*Rolfinck*, Epitome Method. cognosc. c. h. Affect., p. 164.—*Richter*, Deutsche Biblioth., vol. iv., p. 239.—*Senac*, vol. ii., p. 340.—*Portal*, Cours d'Anatomie Médicale, vol. iii., p. 23.—*Baillie's* Works, by *Wardrop*, vol. i.—*Fothergill*, Med. Obs. and Inq., vol. v., p. 246.—*Wall*, in Mem. of Med. Soc., vol. iii., p. 13.—*Luchtmann's* Samml. Auserles. Abhandl., vol. xvii., p. 210.—*J. Copland*, in Lond. Med. Repos., vol. xvii., p. 298.—*Fitzpatrick*, in Ibid., vol. xvii., p. 295.—*Laennec*, De l'Auscult. Médiate, vol. ii., p. 397, Paris, 1819.—*Gerson* and *Julius*, Magaz. der Ausland Literatur. d. g. Heilk., 1822, Sept., Oct., p. 199.—*Macmichael*, in Lond. Med. and Phys. Journ., Aug., 1826.—*Otto*, Pathol. Anat., by *South*, p. 257.—Edin. Med. and Surg. Journ., No. 123, p. 282, 349.—*Smith*, Dub. Med. Journ., July, 1836, p. 426.—*Corrigan*, in Ibid., vol. x., p. 173.—*Watson*, Med. Gaz., 30th July, 1836, p. 701.—*Johnson's* Med. Chir. Rev., Oct., 1836, p. 446.

xi. Polypous Concretions in the Heart.—*Passini*, Epistola de Cordis Polyp. App. ad Librum de Diabete, 4to. Mediol., 1654.—*Malpighi*, De Polypo Cordis, 1666, in Op., p. 123.—*Sheid*, Questionum de Polypo Cordis κεφαλ. Argent, 1689.—*Gould*, in Philosoph. Trans., No. 157.—*Bartholinus*, Hist. Anat., cent. iii., hist. 17.—*Zollikhofer*, De Polypo Cordis. Witeb., 1689.—*Blasius*, Observat. Med. Rarior, p. vi., observ. 1.—*De Berger*, De Cordis Polypo. Witeb., 1689.—*Rossen*, De Polypo Cordis, Leidæ, 1693.—*Albini*, De Polypis. Franc., 1695.—*Snell*, De Polypo Cordis. Giess., 1702.—*Bonet*, Sepulch., l. ii., sect. 11, obs. 6.—*De Cruyskerken*, De Polypo Cordis. Leidæ, 1705.—*Gohl*, De Cordis Polypis ex neglectis Hæmorrhoidibus. Berlin, 1718.—*Beck*, De Polypo Cordis. Geiss., 1718.—*Goez*, De Polyposis Concretionibus variorum in Pectore Morborum Causis. Altd., 1726.—*Morgagni*, De Sed. et Caus. Morb., epist. xxiv., art. 22, 24; epist. lxiv., art. 9, 10.—*Ludolff*, De Polypo Cordis. Erford., 1727.—*Cowper*, in Philosoph. Trans., No. 270.—*Teichmeyer*, De Polypis in Specie Cordis. Jenæ, 1729.—*Grateloup*, De Polypo Cordis. Argent, 1731.—*A. Knips Macope*, De Aortæ Aneurysmate et Polypo Cordis. Brescia, 1731.—*Boehmer*, De præcavenda Polyporum Generatione. Halæ, 1736.—*Preston*, in Philosoph. Trans., No. 224.—*Thomann*, Annales Instituti Medico-clinici Wirceb., vol. i., p. 101.—*A. Pasta*, Epistola de Cordis Polypo in dubium revocato. Bergamo, 1739.—*Alberti*, De Polypo Cordis. Halæ, 1741.—*Langguth*, De Polypo Infantis Rhachitici. Viteb., 1744.—*Huxham*, in Philos. Trans., No. 464.—*Wichmann*, Ideen z. Diagnostik., b. ii., p. 162.—*Vaughan*, De Polypo Cordis, &c. Edinb., 1761.—*Portal*, Cours d'Anatomie Méd., vol. iii., p. 26, 27.—*Goetzke*, Casus Medicopracticus de Polypo Cordis, &c. Spiræ, 1764.—*Consbruck*, in Diss. Fascic. Observ. Med. Stutg., 1777.—*Jos. Pasta*, De Sanguine et Sanguineis Concretionibus per Anatomen indagatis, et pro Causis Morborum habitis quæstiones Medicæ, 8vo. Bergam., 1786.—*De Haen*, Rat. Med., p. 2, c. 7.—*Tempelman*, in Philos. Trans., No. 481.—*Maincourt*, De Sanguineis Lymphaticisque male Polypis dictis Concretionibus in Corde et in Vasis per vitam existentibus. Paris, 1789.—*Berlioz*, in *Sedillot's* Journ. Générale, &c., vol. xxxvi., p. 288.—*Tiedemann*, De Cordis Polypis, 8vo. Marb., 1804.—*Henning*, in *Hufeland's* Journ. der Pr. Heilk., b. xxv., st. i, p. 116.—*Pontin*, Præs.—*P. Afzelius*, De Cordis Polypo, 4to. Upsal, 1805.—*Frank*, Act. Instit. Clin. Viln., vol. iii., p. 77.—*Gärtner*, Path. Med. de Polypo Cordis in Specie Infantum. Würceb., 1810.—*Hopfengärtner*, in *Hufeland's* Journ. der pr. Arz., b. vi., p. 529.—*Flormann*, Bemerkun. über Poly. in Herzen, in Svenska Läkare Sällskapets Handlingar., vol. iv., p. 165. Stockh., 1817.—*Simon*, De Cordis Polypo, 8vo. Berol., 1818.—*Michaelis*, in *Hufeland's* Journ der pr. Heilk., b. xviii., st. iii., p. 65.—*Schmidt*, in Ibid., b. xxv., 2 st., p. 172.—*Nasse*, Zur Kenntniss der Herzpolypen, in *Horn's* Archiv. f. Medic. Erfahrung, 1818, July and August, p. 116.—*Heineken*, in Ibid., Jan., 1810, p. 28, 152.—*Schmelcher*, De Polypis Cordis, 8vo. Landshuti, 1819.—*Deegen*, De Polypis Cordis, 8vo. Halæ, 1821.—*Riggacci*, in Archives Gén. de Méd., vol. xvii., p. 276; et in Journ. des Progrès, &c., vol. ix., p. 176.—*Heinrick*, De Polyporum, Cordis genuinorum Natura et Origine, 4to. Jenæ, 1828.—*A. Meckel*, Beitrag. zur Lehre von der Entsteh. der Herzpolypen in *J. F. Meckel's* Archiv. f. Anat. u. Physiol., 1828, No. 2, p. 166, tab. 5.—*Plouequet*, Répert., art. Cordis Polypus, et *Reuss*, Répert. Comm., vol. xiii., p. 117.—*Otto*, in Selt. Beob., vol. ii., p. 54.—*Meckel*, in Handb. der Path. Anat., vol. ii., pt. ii., p. 336.—*Jos Frank*, in Prax. Méd. Univ. Præc., vol. ii., pt. ii., sect. 2.—*Dezeimeris*, Mém. sur les Découvertes en Anat. Pathologique, &c. Paris, 1829.—*Zabriskie*, in Amer. Journ., No. 32, p. 375.

xii. Rupture of the Heart.—*Quesnai*, Des Fièvres, vol. ii., p. 448; and Traité des Causes des Accidens et de la Cure de la Peste, vol. i., p. 201.—*Johnston*, Med. Ber., und Untersuchun, vol. ii., p. 201.—*Zimmermann*, Von der Erfahrung, vol. iii., p. 449.—*Morgagni*, Ep. xxvi., 13; and xxvii., 1, 2, 5, 8; and lxiv., 15.—*Vater*, De Mortis subitaneæ non vulgaris Causis et Remidiis. Viteb., 1723.—Misc. Nat. Cur., Dec. iii., Ann. ix., obs. 164.—*Nicholls*, in Philos. Transact., vol. ii., part i., p. 265.—*Rudolphi*, Bemerk auf einer Reise, u. s. w., vol. ii., p. 62.—*Stoerck*, Annus Med., i., p. 115.—*Morand*, Hist. de l'Acad. Roy. des Sciences, Obs. Anat., 7, 1729.—*Penada*, Saggio d'Osservazioni, vol. iii.—*Salzmann*, De Subitanea Morte a Sanguine in Pericardium effuso., 1731.—*Haller*, Elem. Physiol., i., p. 339, et Coll. Diss. Pract., vol. ii., No. 67.—*Mummsen*, p. 37; and De Corde Rupto. Lipsiæ, 1764.—*Sandifort*, Obs. Anat. Pathol., l. i., c. i., p. 24, 53.—*Meckel*, in Mém. de l'Acad. des Sc. de Berlin, 1755.—*Ludwig*, Prim. Lin. Anat. Pathol. Lipsiæ, 1785, p. 96.—*Portal*, in Mém. d'Acad. Roy. des Sc., 1784.—*Murray*, Resp. *Tengmalin*, De Corde rupto, 4to. Upsal, 1788.—*Portal*, Mémoires sur Plusieurs Malad., vol.

iv., p. 17, 62, 86.—*Chevasse*, in Lond. Med. Journ., 1786, part iii.—*Fiorati*, in Saggi Scientifici di Padova, vol. iii.—*Wright*, in Med. Observ. and Inquiries, vol. vi.—*A. Olmi*, Memoria di una Morte repentina, cagionata della Rottura del Cuore, 8vo. Firenze, 1803.—*Pohl*, De Ruptura Cordis, 4to. Lips., 1808.—*Erdmann*, in *Horn*, N. Archiv., b. iii., st. i., p. 91.—*Brera*, Di una Straordinaria Rottura di Cuore. Verona, 1808.—*Baillie*, Morbid Anatomy, p. 32.—*Cullerier*, in Journ. de Médecine Continué, vol. xii., p. 168.—*Reuss*, Repertor. Comment., vol. xiv., p. 384.—*Ploucquet*, Répert., art. *Cor. Ruptum.*, Dictionn. des Sc. Médicales, vol. xlix., p. 212.—*Hufeland's* Journ. der Pr. Heilk., xiv. b., st. ii., p. 200.—*Testa*, p. 391.—*Angiussola*, in Giornale della Società Med. Chir. di Parma, vol. iii.—*Buchholz*, Beiträge zur Gerichtlichen Arzneigelahrtheit., vol. iii., p. 192.—*Schaeffer*, in *Hufeland* and *Himley's* Journ. der Pr. Heilk., 1811, Aug., p. 30.—*Salzburger*, Med. Chir. Zeitung, 1814, No. 40, p. 239.—*Mott*, in Transact. of the Phys. Med. Soc. of New-York, vol. i., 1817.—*Hazon*, in Journ. de Médecine, vol. ix., p. 316.—*Asdrubali*, in Nuovi Commentari di Med. et de Chir. Padova, 1818.—*Fischer*, in Lond. Med. Repos., vol. xii., p. 164.—*Ackermann*, in Svenska Läkare Sällskap. Handlingar, 1818, vol. v., p. 221.—*Langlade*, in Journ. de Médecine, vol. lxxviii., p. 199.—*Betulin*, Ibid., p. 225.—*Rostan*, in Lond. Med. Repos., vol. xiv., p. 333, 412; and in Journ. Gén. de Médec., p. 72, July, 1820.—*Blaud*, in Biblioth. Medic., vol. lxviii., p. 64, June, 1820.—*Rudolphi*, Physiologie, vol. i., p. 90. Petersb. Vermischte Abhandl. aus dem. Geb. der Heilk., 1821. Erste Samml., p. 231.—*Ashburner*, in Lond. Med. Repos., vol. xix., p. 27, et v., *von Froriep's Notizen*, 1823, No. 89, p. 253 (*Rupture of both Ventricles*).—*Frank*, De Ruptura Cordis, in Prax. Med. Univ. Præcept., vol. viii., part ii., cap. xiii., p. 314. Nouv. Biblioth. Méd., vol. i., No. 3, 1823. Archives Génér. de Médecine, vol. iv., part. iv., 1824.—*Baron*, in Archives Gén. de Méd., vol. vi., p. 619.—*Bayle*, in Revue Médicale, July, 1824.—*Carrier* et *Baron*, in Journ. Compl. du Dict. des Sc. Méd., Oct., 1824. Journ. des Progrès des Sciences Médical., vol. vii., p. 245; vol. xiv., p. 247; and xv., p. 236. Ed. Med. and Chir. Transact., v.—*Horn's* Archiv., Jan. and Feb., 1824, p. 143.—*Hesselbach*, Beschreibung der Pathol. Präparate, u. s. w., p. 321, No. 369.—*Rullier* et *Andral*, in Revue. Méd., vol. ii., 1824, p. 306.—*Thomas*, in Lond. Med. and Phys. Journ., vol. liii., p. 193; March, 1825.—*Ziehl*, in Harless Rhein. Westp. Jahrb., vol. iii., part iii., p. 9.—*Charpentier*, in Journ. Gén. de Méd., May, 1826.—*Berard*, Sur Plusieurs Points d'Anatomie Pathologique, No. 2. Paris, 1826.—*Abercrombie*, in Transactions of the Med. Chir. Soc. of Edinb., 1824, vol. i.—*Ferrus*, *Laennec*, *Blaud*, *L.* and *J. A. Rochoux*, v. *Breschet*, in Répertoire Général, vol. iii., part ii., p. 203.—*Zecchinelli*, in Omodei Annali Universali di Medicina, vol. xxxvii., Feb., 1826, et in Revue Medic., vol. ii., 1826, p. 489.—*Otto*, in Selt. Beob., part ii., p. 59, and Veizeichniss., No. 2245 and 2246.—*Bignardi*, in Annali Univers. di Medic., Jan., 1829.—*Marat*, in Journ. de Médec. continué, vol. vi., p. 587.—*Corvisart*, p. 257.—*Cruveilhier*, Anat. Pathol., l. iii., pl. i.; et l. xx., pl. 2.—*Adams*, in Dublin Hospital Reports and Communications, vol. iv., 1827, No. 19.—*Andral*, Précis, &c., vol. ii., p. 305 and 307.—*A. Williams*, Med. Gaz., vol. iv., p. 78.—*R. Townsend*, Cyclop. of Pract. Med., vol. iv., p. 631.—*Dezeimeris*, in Arch. Gén. de Méd., 1834, 2d series, vol. v. and vi.; and in *Ryan's* Journ., vol. vi., No. 139, p. 288.—*Johnson's* Med. and Chirurg. Review, July, 1836.—*Medici*, in Encyclographie des Sciences Méd., Aug., 1837, p. 159.

xiii. LESIONS OF THE VESSELS OF THE HEART.—*Lentin*, Beyträge zur Ausub. Arzneiwissensch., vol. iii., p. 113.—*Crell* et *Rheinhold*, De Arter. Coronar. instar. Ossis Indurata. Vindob., 1740.—*Morgagni*, Ep. xxiv., 16, 17.—*Sandifort*, Observat. Anat. Path., lib. i.—*Parry*, An Inquiry into the Symptoms and Causes of Syncope Anginosa. Lond., 1801.—*Sam. Black*, in Mem. of the Med Soc. of London, 1805, vol. vi., No. 2.—*Schirt*, in *Horn's* Archiv. der Pr. Med., b. i., Heft. i., p. 136.—*Kreysig*, in Ibid., b. iii., p. i.; et Krankh. d. Herz., b. ii., part ii., p. 532, ff. vol. iii., p. 289.—*Ring*, in Lond. Med. and Phys. Journ., No. 95, vol. xvii., p. 9.—*Ritter*, in *Hufeland's* Journ., vol. xx., p. 117.—*Lucas*, De Depositionibus Cretaceis intra Cordis Valvularum Arteriarumque Substantiam, 4to. Marbourg, 1815.—*Aldis*, in Edinb. Med. and Surg. Journ., vol. v., part xx., No. 5.—*Baillie's* Engravings, Fasc. i., fig. 1, 2, 3, 5.—*Hodgson*, Engravings to illustrate Diseases of Arteries. Lond., 1815, tab. i.; and Dis. of the Art. and Veins, p. 50.—*Meckel*, Tab. Anat. Path., fasc. i., tab. v., fig. 1–8.—*Albers*, in Salzb. Med. Chir. Zeitung, 1815, No. 25, p. 416.—*Faber*, in *Hufeland's* Journ. d. P. Heilk., Aug., 1827, p. 79.—*Louyer-Villermay*, in Bulletin de la Fac. de Méd. de Paris, 1816, No. 1.—*Burns*, Op. cit., p. 34, 157.—*Jurine*, Mém. sur l'Angine de Poitrine, 8vo. Par., 1815.—*Howship*, Op. cit., p. 64.—*Schramm*, Com. Path. de Angina Pect., p. 17. Lips., 1822.

xiv. COMMUNICATION BETWEEN BOTH SIDES OF THE HEART.—*Blankard*, Collect. Med. Phys., cent. iii., No. 52.—*Bartholin*, in Acta Hafniensis, vol. i., p. 100.—*Schrader*, Obs. Ann. Med., dec. i., obs. iv., p. 65.—*Morgagni*, Epist. xvii., 12.—*Brendel*, Ephem. N. C., cent. iv., obs. 166.—*Sandifort*, Obs. Anat. Path., l. iv., c. 6.—*Hagstrom*, in N. Schwed. Abhandl., b. vii.—*Senac*, Op. cit., t. ii., p. 404.—*Spry*, in Memoirs of the Medical Society of London, vol. vi., p. 137.—*Hunter*, Med. Observ. and Inquiries, vol. vi., p. 291.—*Pelletan*, Clinique Chirurg., vol. iii. Par., 1810.—*Tabarrani*, in Atti di Siena, iii., Append., p. 41.—*Tupper*, in Med. and Phys. Journ., vol. iii., p. 497.—*Tacconi*, in Comment. Bonon., vol. vi.—*Corvisart*, Op. cit., p. 276, 290, 293.—*Farre*, Pathol. Researches, &c., p. 27–30.—*Gallois*, in Bullet. de la Faculté de Méd. de Paris, An. 1809, p. 133.—*Caillot*, in Ibid., An. 1807, p. 21.—*Thibert*, in Ibid., An. 1819, p. 355.—*Ribes*, in Ibid., An. 1815, p. 421.—*J. J. Moreau de la Sarthe*, Fragm. pour servir à l'Histoire de la Méd., &c., 8vo. Paris, 1812, p. 45.—*Kreysig*, Op. cit., vol. iii., p. 104, 200.—*Gintrac*, Observ. et Recherch. sur la Cyanose. Paris, 1824.—*J. Thomson*, in Edin. Med. and Surg. Journ., vol. xii., p. iii.—*Bouillaud*, in Nouv. Journ. de Méd., vol. vi., p. 223; et in Op. cit., vol. ii.—*Pasqualini*, Mem. Sulla Freq. Apertura de Foram. Ovale, &c. Roma, 8vo, 1827.—*Lallemand*, Recherches Anat. Path., &c., Lettre iv., p. 7.—*Nasse*, in *Reil's* Archiv. f. d. Phys., t. x., p. 213.—*Horn's* Archiv. f. Med. Erfahrung, Nov. and Dec., 1817.—*Dorsey*, in New-England Journ. of Med. and Surg., vol. i., p. 69.—*H. Jackson*, in Ibid., vol. iii., p. 161.—*Howship*, Pract. Observ. on Surgery and Morb. Anat., cases 57, 59.—*J. F. Meckel*, Tab. Anat. Pathol., fasc. i. et ii.; et Path. Anat., t. i., p. 447; et Descript. Monst. nonnull., p. 50.—*Crampton*, Trans. Coll. of Phys. of Dublin, vol. i.—*R. Thoxter*, in New-England Journ. of Med. and Surgery, vol. v. Boston, 1816.—*Creveld*, in *Hufeland's* Journal d. Pr. Heilk., p. 74, Dec., 1816.—*Delondre*, in *Sédillot's* Journ. de Méd., vol. lx., p. 38.—*Wistar*, S. Gött. Gelehrte Anzeigen, p. 1767, 1818.—*Nordblad*, in Ars-Berättelse om Svenska Läkare-Sällskapets Arbeten, &c. Stockh., 1816.—*Seidel*, Index Mus. Anatom. Kiliensis, p. 61. Kilia, 1818.—*Maréchal*, in Journ. Gén. de Médec., vol. lxix., p. 354, Dec., 1819.—*Thibert* and *Fouquier*, in Bulletin de la Faculté de Médec., vol. vi., p. 355.—*Olivry*, in Journal Général de Médecin, vol. lxxiii., p. 145.—*Hesselbach*, Bericht von der Königl. Anat. Anstalt. zu Würzburg, 1820, und Beschreib. der Pathol. Präparate zu Würzburg, p. 201, No. 541; p. 202, No. 610. Giessen, 1824.—*Nasse*, Leichenöffnungen, p. 166, 1 st. Reihe, 1821.—*Gregory*, in Med. Chir. Transact., vol. xi., p. 296, 1821.—*Olory*, in Repertorio Med. Chir. par l'Anno 1821. Turino.—*Bock*, in *Cerutti's* Pathol. Anat. Museum, vol. i., part iii., p. 37.—*Holmsted*, in Lond. Med. Repository, vol. xvii., p. 455.—*Schallgruber*, Abhandl. in Fache der Gerichtsarzneikunde, p. 55–76. Grätz, 1823.—*Rust's* Magazin f. d. ges. Heilk., vol. xviii., p. 346.—*Hesse*, D. Monstri Bicipitis Descriptio. Anat., p. 20. Berol., 1823.—*C. Perkins*, in New-York Med. and Phys. Journ., vol. ii., p. 444.—*Tiedemann*, in d. Zeitschrift f. Physiologie, vol. i., part i., p. 111, pl. 7, fig. g.—*Coates*, in *Chapman's* Philadelphia Journal of the Med. and Phys. Soc., vol. ix., No. 17, Nov., 1824.—*Rosenstiel*, D. Monstri deplicis rarissimi Descriptio Anatomica, p. 12. Berol., 1824.—*Wertenseka*, Duor. Monstror. duplic. humanor. Descr. Anat., p. 13, tab. 2. Berol., 1825.—*Hall* and *Vrolik*, in Praktisch Tijdschrift voor de Geneeskonde, part ii., 1825.—*Burkart*, De Monstro humano notabili, 8vo. Friburg, 1825.—*Abercrombie*, in Trans. of Med. Chir. Soc. of Edinb., vol. i., p. 1.—*J. F. Meckel*, Descript. Monstr. nonnull., p. 11, 21, 31, 59, 4to. Lips., 1826; et Tab. Anat. Path., Fascic. i.—*Breschet*, in Répert. Gén. d'Anat., &c., vol. ii., p. 12, 17.—*Hufeland's* Journ. der Prakt. Heilk., p. 123, Feb., 1826.—*Delmas*, in Ephémer. Med. de Montpell., vol. i., Jan., 1826.—*Ullrich*, in *Rust's* Magazin, vol. xxii., p. 502.—*Maurau*, in Philadelphia Journ., vol. xiv., p. 253.—*Dujes*, in Journ. Gén. de Méd., vol. ci., p. 88.—*Meyer*, in *v. Grafe's* and *v. Walther's* Journ. der Chir., vol. x., p. 44, pl. 2, fig. 1.—*Knup*, in *Harless*, Rhein-Westphäl. Jahrb. d. Med. und Chir., vol. iv., part. i., No. 8. Archives Gén. de Méd., Sept., 1827.—*Cerutti*, Rarior. Monstri. Descript. Anat., 4to. Lips., 1827.—*Staupe*, Anweisung zu Gerichtl. und Pathol. Untersuchungen Menschl. Leichname, p. 164, note 20. Wien., 1827.—*Cogoreux*, in Revue Méd. Franc. et étrang., vol. i. and ii., 1827.—*Wittcke*, *Hufeland's* and *Osann's* Journ. d. Prakt. Heilk., April, 1828.—*Basedow*, in Ibid., July, 1828, p. 78.—*R. K. Hoffmann*, in New-York Med. and Phys. Journ., vol. vi., p. 250.—*Alibert*, Nosol. Naturelle, t. i., p. 344.—*Otto*, in Selt. Beob., vol. i., p. 16, 64; vol. ii., No. 21, p. 49, 102.—*Legallois*, vol. xii., p. 122, v. Bulletin de la Soc. de Médec., 1809, p. 99.—*Reil's* Archiv. B., and *Meckel's* Descript. Monstror. nonnullor., p. 50.—*R. Knox*, in Edinb. Med. and Surg. Journ., 1815, vol. ii., p. 57.—*Holmes*, in Trans. of Med. and Chirurg. Society of Edinb., vol. i.—*C. J. B. Williams*, in Cyclop. of Pract. Med., vol. iii., p. 63.—*Miguel*, in Archiv. Général de Méd., vol., xvii., p. 430.—*Wittcke*, in Ibid., vol. xviii., p. 83.—*P. C. A. Louis*, in Ibid., vol. iii., p. 325, 485; et Mém. on Recherches Anatomico-Pathol., 8vo. Paris, 1826, p. 301.—*Bonnissent* et *Pinel*, Revue Méd., t. vi., p. 175.—*Cruveilhier*, Anat. Pathol., l., pl. 6.

xv. DISPLACEMENTS OF THE HEART.—*Sennert*, Pract., l. ii., pt. ii., cap. xv., p. 703. Lugd. Bat., 1650.—*F. Plater*, Obs., l. iii., p. 636.—*Lancisi*, De Mort. Subit., p. 136, et de Aneurismatibus, l. ii., prop. 52.—*Mobius*, Fundam. Med.

Physiol., c. x.—*Fabricius Hildanus*, Cent. ii., obs. 33.—*Boerhaave*, Opera Omnia. Hagæ. Com., 1738., p. 3.—*Bartholinus*, Histor. Anat., 1747, cent. ii., hist. 25.—*Meckel*, in Mém. de l'Acad. de Berlin, 1759, p. 44, 45, and 86.—*Meckel*, de Conditione Cord. Abnorm., p. 6.—*Morgagni*, Ep. Anat., xv., n. 53 ; and xvii., p. 25.—*E. Jäger*, De Hepatitide et Phthisi., &c. Tubing., 1780.—*Walter*, in Nouv. Mém. de Berlin, 1775, p. 139.—*Leidenfrost*, Exercit. de Hernia et Prolapsu Cordis Humani. Duisb., 1778.—*Leidenfrost*, Opusc. Phys. Chem. et Med. Lemgo., 1797, vol. i., p. 3.—*Vetter*, Aphorismen aus der Pathologischen. Anat., th. i., sect. 118.—*Harless* und *Ritter*, N. Journ. der Ausland Med. Chir. Literatur., b. vi., st. ii., p. 148.—*Schmidt*, in *Hufeland's* Journ., vol. xxv., p. 189.—*Kelch*, in Ibid., vol. xxv.—*Marc*, in Ibid., vol. xix., pt. i., p. 112.—*Wilson*, in Philosophical Trans., 1798.—*Senac*, Traité du Cœur, l. iv., ch. viii., No. 4, p. 178 ; and ch. ix., No. 7, p. 429.—*Zuliani*, De quibusdam Cordis Adfect., obs. 2-4.—*Testa*, p. 174.—*Otto*, in Selt. Beob.. i., p. 95 ; ii., p. 18. Acta Med. Berol., dec. i., vol. vii., p. 98.—*Delamare*, in Journ. de Med., vol. xxxiii., p. 510.—*Schwarz*, Paradoxum Asthma cum Corde e Situ naturali deturbato, 4to. Heidelb., 1803.—*Breschet*, in Répertoire Gén. d'Anat. et Phys., vol. ii., p. 1 ; and vol. i., p. 212.—*Laennec*, De l'Auscultation Médiate, vol. ii., p. 336. Paris, 1810.—*Harless* and *Ritter's* N. Journ. d. Ausländ. Med. Chir. Lit., vol. vi., p. 148.—*Dechamps*, in Journ. Génér. de Méd., vol. xxvi., p. 276.—*Heinecken*, in *Horn's* Arch., 1810, Jan., p. 28.—*Klins*, in Abhandlungen der Josephsakademie, vol. i., p. 273.—*Sömmering*, De Morb. Vasor. Lymphaticor., p. 139. — *Friese*, Archiv. der Pract. Heilk. f. Schlesien., vol. iii., p. iii., No. 6.—*Larrey*, Mém. de Chir. Milit., &c. Paris, 1812.—*Rust's* Magazin, vol. v., p. 165.—*Ficker*, in *Harless*, Rhein. Jahrb. f. Med. und Chir., vol. iv., p. 34.—*Plencis*, Acta et Obs. Med., p. 162.—*Werderwann*, in Mursinna's N. Journ. f. d. Chir., vol. i., p. 168. —*Horn*, N. Archiv. f. Medicin. Erfahrung., vol. iii., p. i., No. 3.—*Corden*, in Mem. of the Med. Soc. of London, vol. vi., p. 122.—*Ramel*, Journ. de Med., t. xlix., p. 423 (*Below the diaph. in the situation of the stomach*).—*Corvisart*, in *Leroux*, Journ. de Médec. cont., vol. ii., p. 14.—*Lallemand*, in Ibid., p. 24.—*Wilson*, in Philos. Trans., 1798, p. 346 (*In the region of the stomach*).—*Ehrhardt*, De Aneur. Aortæ Commentatio, 4to. Lipe., 1820.—*Brera*, Della Stenocardia malatti Volgarmente conosciuta sotto il Nome di Angina Pectoris. Verona, 1810. — *Deschamps*, Journ. Génér. de Méd., t. xxvi., p. 275 (*In the place of the left kidney in an aged man*).—Giornale di Medicina Practica, 1814, p. 1-26. —*Jos. Averandi*, De Angina Pectoris, ejusque Præcipua Specie, Stenocardia, ib., Jan., 1816. — *Abercrombie*, in Transact. of the Med. Chir. Sac. of Edin., 1824, vol. i.—*Graves* and *Stokes*, in Dub. Hosp. Reports, vol. v., p. 10.—*Hosship*, Practical Observations, case 64.—*W. Stokes*, in Edin. Med. and Surg. Journ., No. 108 ; and in Med. Gazette, vol. viii., p. 560.—*R. Townsend*, Cyclop. of Pract. Med., vol. ii., p. 387.

xvi. Of Organic Changes of the Heart in general, &c.—*Abbartenfels*, Programma de Corde, ejusque Affectibus. Erf., 1697.—*Reil*, Analecta ad Histor. Cordis Pathолog., 4to. Halæ, 1790.—*Cabirau Cabannes*, Aperçu sur quelques Affect. Organiques du Cœur, 8vo. Paris, 1805.—*Le Herisse*, Propos. sur les Affect. Organiques du Cœur, 8vo. Paris, 1806.—*Warren*, Cases of Organic Dis. of the Heart, with Dissections and Remarks, &c., 8vo. Boston, 1809.—*Grassal*, Sur quelques Affect. Organiques du Cœur, 4to. Paris, 1820.—*Mayer*, Berichte über Organische Fehler des Herzens u. d. Gross. Blutgefasse in d. Vesterreich. Med. Fahrb., b. v., No. 3, 1829, p. 59.—*J. A. Walther*, De Variis Cordis Affectibus. Halæ, 1821.—*Stadelmeyer*, De Morbis Cordis organicis Observationes quædam, 8vo. Wurtzb., 1827.—*L. W. Probsting*, De Morb. Cordis organicorum Diagnosi Generali. Bonn., 1829.—*Graves* and *Stokes*, in Dub. Hosp. Reports, vol. v.—*J. J. Philip*, De Nonnullis Cordis Morbis organicis, 8vo. Berl., 1832.—*Olivier, Littré*, and *Chomel*, in Dict. de Méd., 2d ed., t. viii., art. *Cœur*.—*J. Frank*, Prax. Med. Universæ Præceptæ, t. ii., par. ii., sect. 2, p. 114.—F. *G. Boisseau*, Nosographie Organique, t. iii., p. 24.—*J. J. Leroux*, Cours sur les Généralites de la Méd. Pratique, t. v. et vi., 8vo. Paris, 1826.—*J. B. G. Barbier*, Précis de Nosologie et de Therapeutique, t. ii., 8vo. Paris, 1828. — *J. F. Lobstein*, Traité d'Anat. Pathologique, t. ii., 8vo. Paris, 1833.—*J. Wardrop*, the Nature and Treatment of Diseases of the Heart, part i. London, 1837.—*P. Bright* and *T. Addison*, Elements of the Practice of Medicine, part ii., p. 327.—*J. F. Sobernheim*, Prakt. Diagnostik der Innern. Krankh., &c., 8vo. Berl., 1837, p. 117.—*J. Bizot*, in Mém de la Soc. Méd. d'Observation, t. i., p. 271.—*H. Mayo*, Outlines of Human Pathology, 8vo. Lond., 1835, p. 465.—*M. G. Andral*, Cœurs de Pathologie Interne, &c., Liv. Deuxieme. Paris, 1837. (*See, also*, Bibliog. and Refer. *to the chapter on* Diseases of the Heart in general (p. 202), *and to the other chapters and sections of this article.*)

[Am. Bibliog. and Refer.—C. *W. Pennock* and *E. W. Moore*, Report of Experiments on the Action of the Heart, 8vo, p. 18. Phil , 1839 ; et Med. Examiner, No. 44 ; et Am. Jour. Med. Sci., vol. xxv., p. 415 (A very able document).—Report of Med. Sect. of Brit. Association, On Motion and Sounds of the Heart, in Am. Jour. Med. Sci., vol. xviii., p. 194, and in *Bell's* Eclectic Journ. of Med., vol. iii., p. 38.—*Isaac Hays*, Review of Works on Cardiac Diseases, Ibid., vol. vi., p. 139.—*J. A. Swett*, Observations on the Diagnosis of Diseases of the Heart (organic and functional), with illustrative Cases, in New-York Quarterly Journal of Med. and Surgery, vol. iii., p. 1.—*John Bell*, Review of *Bouillaud* on the Heart, in Eclectic Journal of Med., vol. i., p. 261.—Notice of *Knox*, On Pulsations of the Heart, Ibid., vol. i., p. 325 ; of *Lees*, On Wounds of do., Ibid., vol. i., p. 409.—*Valentine Mott*, Case of Rupture of the Heart, in New-York Med. Magazine, and Trans. of the N. Y. Phys. Med. Soc., vol. i.—*G. C. Monell*, Rupture of the Heart, New-York Med. Gazette, vol. ii., p. 136.—Translation of *Cruveilhier*, On the Motions and Sounds of the Heart, Ibid., vol. i., p. 186, 201.—*John C. Warren*, Cases of Organic Diseases of the Heart. Boston, 8vo, p. 61, 1809.—*Charles W. Chauncy*, Translation of *Bertin's* Treatise on the Diseases of the Heart. Phil., 1833.—*Harper Walton*, Case of Sudden Death connected with Organic Disease of the Heart, Am. Jour. Med. Sci., vol. xi., p. 117.—*T. H. Wright*, Cases of Cardiac Disease, in Am. Jour. Med. Sci., vol. iv., p. 340 ; vol. xii., p. 17.—*Leonard Randall*, Gun-shot Wound of the Lungs and Heart, in West. Jour. of the Med. and Phys. Sciences, 1828.—Review of *Hope*, On the Heart, in Am. Jour. Med. Sci., vol. ii., p. 63.—*J. B. Zabrishie*, Case of Polypus of the Heart, where Death occurred during Labour, in Am. Jour. Med. Sci., vol. xvi., p. 375.—*Edward Hallowell*, On Rupture of the Heart, and the Morbid Appearances associated with it, Ibid., vol. xvii., p. 74, and Cases of Disease of, Ibid., vol. xxii., p. 365.—*J. R. Cease*, On Wounds of the heart, Ibid., vol. iv.—*Samuel Jackson*, Case of Disease of the Heart and Larynx, with a Plate, Ibid., vol. xv., p. 289.—*W. W. Gerhard*, Review of *Bouillaud*, On Diseases of the Heart, in Ibid., vol. xiv., p. 149.—*Wilmer Worthington*, Case of Malformation of the Heart, Ibid., vol. xxii., p. 131.—*J. J. Alison*, Observations relative to Lymphatic Hearts, Ibid., vol. xxii., p. 377.—*D. F. Condie*, Notice of *Wardrop*, On Diseases of the Heart, Ibid., vol. xxiv., p. 419.—*C. Brunckhausen* and *R. Nelson*, Translation of *Hufeland's* Enchiridion Medicum, or the Pract. of Medicine, the Result of 50 Years' Experience. N. Y., 1844. —*S. G. Morton*, in Am. Ed. of *Mackintosh's* Principles of Pathology and Prac. of Medicine. Phil., 1844.—*D. Hosack*, Lectures on the Theory and Prac. of Physic. Phil., 1838, edited by *H. W. Ducachet*, M.D.—*John Eberle*, Pract. of Medicine.—*Meredith Clymer*, On Sounds of the Heart, in Am. Ed. of *Wilkams's* Treatise on Diseases of the Respiratory Organs. Phil., 1845.—*Robley Dunglison*, The Prac. of Med., 2d ed. Phil., 1844, 2 vols.—*Wm. P. Dewees*, A Practice of Physic, &c. Phil., 1833.—*John Bell* and *Wm. Stokes*, Lect. on the Theo. and Prac. of Physic. Phil., 1845, 2 vols., 8vo.—*W. A. Harris*, Trans. of *Arau's* Practical Manual of the Diseases of the Heart and Great Vessels, 12mo, p. 296. Phil., 1843.—*John M. Galt*, Practical Medicine, &c. Phil., 8vo, p. 328, 1843.—*Jacob Bigelow*, Brief Rules for Exploration of the Chest in Diseases of the Lungs and Heart, Bost. Med. and Surg. Jour., vol. xx., p. 357.—*Samuel Henry Dickson*, Essays on Pathology and Therapeutics, 2 vols. Phil., 1845.—*Cyrus Perkins*, A Case of Malformation of the Heart, with Physiological Remarks, N. Y. Med. and Surg. Jour., vol. ii., p. 444.—*E. T. Richardson*, Report of Cases of Organic Disease of the Heart, in New-York Journal of Medicine, vol. ii., p. 374.—Review of *Hope*, On Diseases of the Heart, and of *Pennock* and *Moore's* Experiments on the Action of the Heart, Ibid., p. 417.—*David D. Marvin*, Curious Case of Violent Action of the Heart and Arteries, in New-York Lancet, vol. i., p. 58. —*B. F. Joslin*, Wound of the right Ventricle of the Heart, Ibid., vol. ii., p. 231.—*Charles C. Hildreth*, Case of Pericarditis, in Am. Jour. Med. Sciences, July, 1845, No. xix., N. S.—*J. Stimson*, Bost. Med. and Surg. Jour., vol. i., p. 70.—*V. M. Dow*, Case of Organic Disease of the Heart, in Ibid., vol. xxx., p. 120.—*S. A. Cook*, Fatal Diseases of the Heart, Ibid., vol. xxx., p. 141.—*N. G. Trow*, in Ibid., vol. iii., p. 155-331, 450.—*J. P. Harrison*, Hypertrophy of the Heart, Ibid., vol. xxx., p. 434.—*W. W. Gerhard*, Lectures on the Diagnosis, Pathology, and Treatment of the Diseases of the Chest. Philadelphia, 1842, 8vo.—*Charles Hooker*, An Essay on the Diseases of the Heart, containing a New Hypothesis by which the Physical Signs are explained, in Boston Medical and Surgical Journal, vol. ii., p. 9, 21, 329, 399 ; vol. ix., p. 245, 283, 293, 341, 357, 376.—*W. E. Horner*, A Treatise on Pathological Anatomy.—*Samuel D. Gross*, Elements of Pathological Anatomy, 2 vols., 8vo. Boston, 1839.—*Charles A. Lee*, Case of Polypus of the Heart, in N. Y. Med. and Phys. Jour., vol. ii., p. 444.—*A. C. Post*, Pericarditis and Tubercles of the Heart, New-York Med. Journal, vol. i., p. 253.—*J. Mauran*, Malformation of the Heart, Phil. Jour. of Med. and Phys. Sciences, Aug., 1827. —*Samuel Fahnestock*, Malformation of the Heart, in Am. Med. Recorder, vol. vi., p. 282.—*Robert R. Barton*, Case of Disease in which the Heart was found in the right Side of the Chest, Am. Med. Recorder, vol. iv., p. 217.—*A. Bullard*, Inflammation of the Pericardium and Inflammation of

the Pleura, in New-Eng. Jour. of Med., vol. ii., p. 268.—*George Winslow*, Case of Malformation of the Heart, in New-Eng. Jour. of Medicine, vol. ii., p. 128.—*Richard K. Hoffman*, Malformation of the Heart, in N. Y. Med. and Phys. Jour., vol. vi., p. 250.—*William G. Reynolds*, An Essay on Aneurism of the Heart, in Phil. Med. and Phys. Journal, vol. v., p. 226.—*John Wiltbank*, An Experimental Inquiry into the Action of the Heart, in Ibid., vol. ix., p. 361.—*S. Randall*, Wound of the Heart, in Western Jour. of Med. and Phys. Sc., Oct., 1828.]

HEPATITIS.—See Liver, Inflammation of.

HERPETIC ERUPTIONS. — Syn. *Herpes*, Ἕρπης (from ἕρπειν, to creep), Galen, Dioscorides; *Formica*, Avicenna. *Cytisma Herpes*, Young; *Herpes*, Sauvages, Linnæus, Willan; *Serpigo*, Auct. var. *Ecphlysis Herpes*, Good; *Dartre, Herpe*, Fr.; *Die Flechte, Zittermal*, Germ.; *Erpete*, Ital.; *Vesicular Tetter, the Serpigo, Fret.*

Classif.—4. *Class*, 8. *Order* (*Cullen*). 6. *Class*, 3. *Order* (*Good*). 6. *Order*, 3. *Genus* (*Bateman*). III. Class, I. Order (*Author in Preface*).

1. Defin.—*An eruption of vesicles, in distinct irregular clusters, upon inflamed bases, which extend somewhat beyond the margin of each cluster; attended by tingling, concreting into lamellar scabs, and not contagious.*

2. A genus of eruptions, characterized as just stated, has been very accurately described by Willan, Bateman, Bietт, and Rayer under the name of *herpes*. This designation represents, according to the above definition, affections in many respects different from those comprised under it by Lorry, Turner, Alibert, and others, and is employed by the former writers in a more rigorous sense. Yet the several *species* enumerated by Bateman and Rayer are manifestly too numerous, some of them being merely varieties arising out of the forms which the clusters of vesicles assume, and of the situations in which they are often observed. In this opinion I am supported by M. Bietт and Dr. A. T. Thomson, who have arranged them accordingly.

3. *Herpes* is an inflammatory affection, chiefly of the vascular rete of the skin, causing the effusion of a thin fluid, which elevates the cuticle into groups of small vesicles. This affection occurs generally in circumscribed patches, the skin retaining its natural aspect in the intervals; passes through a regular course of increase, maturation, and decline, and terminates usually in from ten to fifteen days, but is sometimes prolonged to twenty-one days. It is frequently preceded by constitutional disorder, and is sometimes critical of other diseases. The vesicles are filled at first with a colourless and clear fluid, which gradually becomes milky and opaque, and ultimately concretes into thin scabs; but occasionally a discharge of it takes place, and ulcerations follow. Tingling or pricking pains sometimes attend the eruption. In some cases, as the crusts fall off in one part, fresh vesicles arise in the vicinity, and the eruption thus creeps over a large portion of the surface, and its duration is thereby prolonged. Adopting the division of M. Bietт and Dr. A. T. Thomson, I shall consider the forms of Herpes as follows: *Species* 1. *Herpes Phlyctenodes*; var. *a. H. Zoster*; *b. H. Circinnatus*; *c. H. Labialis*; *d. H. Præputialis*. —*Species* 2. *Herpes Iris*.

4. I. Description.—Spec. i. Herpes Phlyctenoides. — Charact. — *An eruption of small, transparent, round vesicles, in irregular agglomerated patches, preceded and attended by slight constitutional disorder.*

5. This species occasionally appears on the forehead, cheeks, and neck, but more commonly on the extremities, and is often disseminated over different parts of the body. A sensation of itchiness, tingling, or painful smarting, or pungent heat of the part about to be affected, is followed by very minute and almost imperceptible red points, clustered so as to compose an irregular-coloured patch, varying from the size of half a crown to that of the palm. After some hours, or next day, a number of hard, shining, round vesicles, the size of millet-seeds, or a little larger, arise on the inflamed patches, and are filled with a colourless or pale citron-coloured serum, or with a brownish serum in the aged or cachectic. The vesicles are grouped in irregular clusters, of different sizes, varying from a dozen to fifty vesicles, or more. To the primary cluster or clusters others succeed, the integuments intervening between the clusters preserving their healthy hue. The tingling and smarting are increased by heat, and by the warmth of bed. The size of the vesicles generally increases, and some acquire that of a pea, or become larger, apparently by the confluence of several into one. In about twenty-four or thirty-six hours the fluid in the vesicles becomes milky in the smaller, and brownish, or sanguinolent, in the larger. The whole decline or break from the sixth to the tenth day, but new clusters often continue to arise. The fluid and detached cuticle are rapidly turned into yellowish or blackish scabs, which are loosened or fall off from the tenth to the fifteenth day, or even later. The surface affected retains for some time a red or livid colour, and continues the seat of prickings or smarting. The fluid of the very minute vesicles is occasionally absorbed, and thus some of the clusters miscarry. In rare cases, the clusters have a circular form, and the areas of the groups are covered by distinct vesicles—the *Nirles*. This form is attended by severe pain, and much constitutional derangement.

6. This species of herpes is generally preceded by disorder of the digestive organs, flatulent distention or oppression at stomach; by thirst, heat, and slight febrile disturbance, and by an unhealthy state of the excretions. The constitutional disturbance is not relieved by the eruption, but often aggravated by the heat and tingling of the successive groups of vesicles. This eruption usually assumes an *acute* form, and *terminates* within three weeks, but it sometimes becomes *chronic*, one crop of vesicles succeeding another. It may appear in persons labouring under other diseases, especially of the biliary organs, and of the digestive mucous surface.

7. *A. Herpes Zoster.* — Syn. Ζωστηρ; *Zona*, Scribonius Largus, Sagar; *Herpes Zoster*, Hoffmann, Willan; *Erysipelas Zoster*, Sauvages; *Shingles.* — This variety differs from phlyctenoid herpes in the size of the vesicles, in the seat of the eruption, and in the mode in which the clusters successively appear and extend themselves. The vesicles are closely agglomerated, but distinct; they increase to the size of pearls in twenty-four hours, and are filled with a limpid, transparent fluid. The inflamed

bases are irregular and large, extending some distance beyond the vesicles. The most frequent seat of this variety is the trunk, particularly the abdomen and lower part of the thorax. As the patches successively appear, they extend either obliquely round the waist or across the shoulders, or from the shoulder to the arm, or from the nates obliquely down the thighs. They very rarely advance perpendicularly. The right side is more frequently affected than the left, the eruption rarely or never appearing on both sides at once. Of fifty-three cases, Rayer observed thirty-seven on the right side.

8. Shingles are preceded by febrile rigours, quickened pulse, headache, thirst, and disorder of the digestive organs and of the excretions. Pains darting across the chest, scalding heat, smarting or stinging pain in the part about to be the seat of irruption, are also often present, but frequently the antecedent and attendant constitutional disturbance is but slight. The eruption consists at first of patches of shining or silvery vesicles. These usually extend in the form of a zone, but sometimes they appear at the opposite extremities of the zone, and join by successive patches extending towards the centre. The vesicles of the individual groups reach their utmost size, which seldom exceeds that of a pea, in three or four days. The patches are then more florid, and the redness extends a few lines beyond their circumference. At the end of five or six days the fluid of the vesicles presents an opalescent hue, becomes sero-purulent, or even purulent, if the inflammation run high. The redness of the base is now deeper, or more livid, and some of the vesicles subside; others break even before this, and, the cuticle being detached, suppurate for a few days; but the greater number dry up, and form yellowish, or brownish lamellar, or prominent scabs, which, in ten or twelve days, fall off, leaving the skin red and tender. In old, debilitated, or cachectic persons, the vesicles often enlarge into *bullæ*, soon break, suppurate, or even ulcerate. The greater number of vesicular groups of zonæ arise in succession; and, while those which have first appeared are becoming purulent, or drying up, others arise in the intervals, and pursue the same course. In from ten to twenty-one days the whole of the incrustations are detached; but, when the vesicles are very large, or confluent, and the skin much inflamed, ulceration sometimes takes place, and the disease is much longer protracted. In some cases the pain described above continues for a time after the eruption has healed. The febrile symptoms often subside when the eruption is completed, but these symptoms are sometimes aggravated during its progress, the deep-seated pain in the part occasionally continuing to the last.

9. *B. Herpes Circinnatus—Ringworm, Vesicular Ringworm*—is characterized by small, round, and crowded vesicles arranged in the form of rings. It appears on the neck, cheeks, forehead, arms, shoulders, and other places, in red, oval, or circular spots, of half an inch to two inches in diameter, and is attended by itchiness and smarting. The redness is much less in the centre than towards the circumference of the smaller spots, and is entirely wanting in the areas of the larger patches. Small vesicles, whose bases are slightly inflamed, containing a transparent fluid, rapidly appear in the circumference of the patches, the areas becoming temporarily of a slight red colour. From the fourth to the sixth day of the eruption the redness declines, the vesicles become turbid, and either burst or are covered with thin, brownish incrustations, which are detached between the tenth and fifteenth day, a slight desquamation at the same time taking place from the centres of the patches, when the redness had extended to them. Patches of small size often have the fluid in their vesicles absorbed, the cuticle exfoliating. The duration of this eruption does not extend above the time just specified, but it may be protracted very much longer when the eruption of the vesicular rings is successive. In some instances the areas of the patches are covered with minute vesicles, and when this is the case, the patches spread, and extend over a considerable space. M. Rayer and Dr. A. T. Thomson state that this eruption is seldom accompanied by any constitutional disturbance. This, however, does not agree with my experience. The general disorder is certainly very slight, and thus escapes detection; but in most cases the digestive canal is more or less deranged, and the evacuations morbid.

10. *C. Herpes Labialis—herpes of the lips*—is similar to the varieties already described, as respects the characters and progress of the vesicles, the only differences resulting from situation. It may be seated either in the lower or in the upper lip, or it may extend around the mouth. It is sometimes confined to the angles. It usually appears outside of the true lips, extending to the line of union between these and the skin. Sometimes patches of the eruption also appear on the cheeks and alæ of the nose. In three or four days the vesicles contain a yellowish, purulent fluid. The lips swell, and, as the disease proceeds, become hard, sore, stiff, hot, and smarting. After the vesicles break, and crusts form, and especially if the latter are prematurely removed, the redness increases, the surface becoming harsh or cracking, and the disease is often protracted. When it is consequent on disorder of the digestive organs it often assumes a chronic form. This variety is generally consequent upon a febrile state of the system and disorder of the prima via. The patient complains of headache, chills, pains in the limbs, lassitude, and want of appetite for some time before the eruption appears. The alvine evacuations are usually morbid, and the abdomen often tumid or tender. Sometimes this variety is critical of catarrhal complaints, of agues, and of several acute diseases attended with pyrexia. It is occasionally preceded or accompanied by vesicles or aphthæ in the mouth.

[This variety is often produced directly by the application of any irritating cause; we have often seen it result from the application of a strong solution of nitrate of silver to the throat and fauces. It is frequently met with in those who use distilled liquors, and sometimes cannot be traced to any appreciable cause.]

11. *D. Herpes Præputialis (Aphthæ præputii vel vulvæ—Ulcuscula præputii)* is characterized by one or more groups of small, round vesicles on the outer or inner surface of the præpuce, or on both, that usually disappear in about

a fortnight. It begins in one or several patches of from four to eight lines in diameter, which are circumscribed, and of a vivid red, and rarely appears on the glans penis. The eruption of vesicles is preceded by itching and tingling of the part, which is slightly inflamed and tumid. Small vesicles arise between the second and fourth day, containing a transparent serum, which about the fourth day becomes turbid, and afterward puriform. On the exterior they dry and form scabs, from the fifth to the seventh day, of a lamellar or conoid form; and if the part be not exposed to irritation or friction, the healing process proceeds underneath the scabs, which are thrown off from the seventh to the tenth day. When the eruption occurs on the inner surface of the præpuce, the vesicles generally break as early as the fourth day, and the inflamed rete becomes exposed, forming a superficial sore, which has been mistaken for chancre.

12. This variety of herpes not infrequently occurs on the *labia vulvæ* of women affected with leucorrhœa, or during pregnancy and after delivery; and the eruption may be either internal, or within the labia. In these cases, the characters and progress of the vesicles, and of the consecutive sores, are the same as already described.

13. ii. Herpes Iris.—Charact. *Small groups of vesicles surrounded by four concentric erythematous rings of different hues.*

14. This species was first arranged under herpes by Dr. Willan. It was accurately described by Dr. Bateman. It occurs most frequently on the back of the hands, olecranon, knees, ankles, instep, and similar parts. It commences in small, red spots, consisting of concentric rings of varying shades. These spots enlarge from two to about eight lines in diameter, and in their centres a yellowish-white, flattened vesicle appears from the second to the third day, surrounded by several others of a smaller size, arranged in a ring. This central vesicle is surrounded by a circle of a dull brown colour, this by a second nearly of the colour of the vesicle; this second by a third circle of a deeper red; and the third, by a fourth, formed on the seventh, eighth, or ninth day. This, the most external ring, is of a rosy tint, which passes insensibly into the colour of the healthy skin. The third is the narrowest of these rings; and they may all become covered with vesicles, but the first is most frequently so covered. From the tenth to the twelfth day the fluid of the vesicles is absorbed, or it escapes and dries into scabs, which are detached two or three days afterward.

15. II. Causes.—The causes of the varieties of herpes are often very obscure, and consist rather of some anterior disorder of the constitution, characterized by deranged digestion and excretion, and by vascular irritation, than of direct agents. The truth is, that they are altogether symptoms of pre-existing disorder of the system, implicating especially the digestive, the biliary, and excreting functions. They do not depend upon contagion, and they may occur several times in the same person. They are often an advanced symptom, which frequently proves critical, of catarrhal, febrile, or inflammatory affections.—*a. Herpes Zoster* is most commonly observed in persons having delicate and irritable skins, between twelve and thirty years of age; but it is also met with in the aged. It is most prevalent in summer and autumn, and is generally dependant upon derangement of the biliary organs and digestive canal.—*b. Herpes Circinnatus* is common in children, especially in girls of a delicate frame, with thin, irritable skins, and often depends upon the same internal disorder as the foregoing.—*c. Herpes Labialis* is often consequent upon catarrhs produced by vicissitudes of temperature; but in its more chronic states it is usually connected with derangement of the organs of digestion.—*d. Herpes Præputialis* is frequent in middle-aged men, or in those advanced in life. It sometimes accompanies stricture, or an irritable state of the urethra, or disorder about the neck of the bladder. More frequently it depends upon acrid secretions from the root of the glands. It is independent of the use of mercury, as it is also of affections of the urethra, although often connected with these affections. It is frequently symptomatic of chronic derangement of the liver and digestive tube. It is non-cotagious.—*e. Herpes Iris* is most common in children and fair, delicate females. It may also be considered as dependant upon internal disorder.—All the varieties of herpes occasionally appear after unwholesome articles of food, and other errors of diet; and after perturbations of the mind, especially when disorder of the digestive functions had previously existed.

[The *Rhus radicans* (*poison vine*) and the *Rhus toxicodendron* (*poison oak*) produce a vesicular eruption which can scarcely be distinguished from herpes; so close, indeed, is the resemblance, that herpes is often attributed to poisoning from these plants. Prof. Dunglison has described two cases (*Am. Med. Intelligencer*, Oct. 1, 1838) in which a vesicular eruption was produced by the leaves of the *Pastinaca sativa*, or *common garden parsnip*, on the extremities of individuals who worked in a garden where the vegetable was cultivated.]

16. III. Diagnosis.—Herpes was often confounded, by writers previous to Willan, with erysipelas, impetigo, and eczema.—*a.* It is to be distinguished from *Erysipelas* by the numerous, small, clustering vesicles; by the healthy surface between the clusters, and by the absence of redness and tumefaction before the vesicles appear; and from *Pompholyx* by the vesicles arising in groups or patches on an inflamed base.—*b.* Neither *Eczema* nor *Impetigo* assumes the purely vesicular form, nor runs the same course within a limited time, nor forms the dry, harsh scab which characterizes herpes.—*c. Herpes Circinnatus*, when appearing on the forehead and at the roots of the hair, may be mistaken for *Porrigo scutulata*, but the vesicular form of eruption, the regular course it pursues, and the persistence of the hair, distinguish it from this affection.—*d. Herpes Præputialis* may be confounded with *syphilitic pustules* or *ulcers*. The common chancre commences by a single pustule, whereas the herpetic affection consists of a cluster of vesicles, the thick scabs of the former differing from the thin incrustations of the latter. When herpes is seated on the inner surface of the præpuce, and has passed into the state of excoriation, the diagnosis is more difficult. But the superficial clustering character

of the sore is different from the deep ulcer of syphilis, with its hard, elevated edges, and the small, gray-coloured false membrane covering its bottom.

[*Herpes* is also sometimes confounded with *pemphigus*, but the bullæ in this affection are rapidly developed, sometimes in twenty-four hours; they frequently acquire a very large dimension, and are commonly isolated and scattered on various parts of the body; sometimes they fade and dry up in two or three days without forming any notable crusts. It is also sometimes mistaken for *scabies*, or *itch*, especially when its vesicles are accompanied by slight inflammation, the colour of the skin but little altered, and the seat of the eruption only on the hands and forearm. But in *herpes* it is the dorsal portion of the hands which is commonly attacked, and not the *interdigital spaces, the wrist, and the folds of the elbow-joint*. Instead of the small, few, and isolated vesicles of the itch, there are a number of closely approximated ones, which almost acquire the size of a large pin's head, or even a larger size; besides, the eruption has a regular march, and terminates spontaneously by desquamation at the end of one, two, or three weeks.]

17. IV. TREATMENT.—*A*. This is nearly the same in all the varieties, and should be based upon the pathological dependance of the disease insisted upon above (§ 15). Keeping the connexion of the eruption with disorder of the digestive organs closely in view, a mild ipecacuanha emetic should be exhibited, and subsequently any gentle purgative, with magnesia or an alkaline carbonate. Afterward a free use of diluents and abstinence are all that will be required in most cases. In the more severe attacks, especially of herpes zoster, additional means will often be called for. Where there is much antecedent or attendant fever, M. RAYER advises a moderate bleeding, or the application of a number of leeches to the anus, or around the seat of eruption. Neither of these is often necessary. When the evacuations are morbid, and the biliary functions impaired, a dose of blue pill, or of calomel, at bedtime, and a mild purgative, containing an antacid, the following morning, will generally be of service. It may be even requisite to repeat these, and afterward, particularly when the urinary and fæcal excretions are disordered, to promote the actions of the liver and kidneys by small doses of colchicum, with magnesia or an alkaline subcarbonate. In the more painful cases of zona, these means will be found most beneficial. During the course of the complaint, the diet should be mild, chiefly farinaceous, and in small quantity. The beverages should be demulcent and cooling.

18. *B*. When herpes assumes a chronic character, owing to the successive eruption of clusters of vesicles, or to the excoriation of the inflamed skin, small doses of blue pill, or of the hydrargyrum cum creta, and mild stomachic aperients, are the most appropriate means. In addition to these, the decoction of sarsa, or of the elm-bark, with liquor potassæ, are often very serviceable. In *herpes labialis* and *herpes præputialis* these remedies are especially required In more obstinate cases, particularly when the excretions continue disordered, mild stomachic purgatives and alteratives should be persisted in, and warm or tepid bathing, or even vapour baths, occasionally employed. In *herpes iris*, the warm bath and minute doses of the arsenical solution, with the liquor potassæ, are generally of service. Dr. A. T. THOMSON recommends for this species the decoction of the Rumex obtusifolius with these alteratives.

19. *C*. When herpes occurs in cachectic or aged persons, not only should great attention be paid to the state of the excretions, all fæcal and morbid accumulations being duly evacuated, but the digestive and assimilating functions ought to be promoted, by exhibiting gentle tonics with the alkaline carbonates. If the eruption ulcerate, the application of nitrate of silver in substance, or in a strong solution, will promote cicatrisation. If there appear a disposition to slough, the preparations of bark, &c., will be required. When violent sub-cutaneous pains accompany zona, hyoscyamus or other narcotics may be given with the medicines already recommended; but the warm or vapour bath and colchicum, as above prescribed (§ 17), will be found the most successful. In *herpes præputialis* and *herpes vulvæ* the early application of nitrate of silver will often shorten the duration of the eruption. Where there are much heat and stinging of the parts, a wash containing the sub-borate of soda, or the sulphate of zinc, or of alumina, will often be useful. These may also be prescribed in herpes circinnatus; but in all cases the chief attention must be directed to the removal of disorder in the digestive and biliary organs, and to the regimen of the patient.

[When *herpes circinnatus* passes into the chronic state, *sulphur baths* will be found very useful, and the following ointment will often suffice to disperse the small furfuraceous rings which remain on the surface of the skin. ℞ *Lard* ʒj.; *Sulphuret of Lime*, ʒj.; *Camphor*, gr. xv. M. The use of the natural sulphur waters, as at Avon and Sharon Springs, will also be found efficacious in the removal of the different forms of this complaint. Sulphur baths are generally prepared in the French hospitals by adding four ounces of the solid *sulphuret of potash*, or eight ounces of the liquid, to the bath; but we may substitute, as equally efficacious, and far more economical, the *sulphuret of lime*, and, by adding a small quantity (ʒij.) of muriatic acid to the water, we increase the precipitation of sulphur and the disengagement of sulphuretted hydrogen. There is reason, however, to believe that the crystallized *hydro-sulphate of soda* will prove still better adapted to this purpose, being less odoriferous, and furnishing a water more nearly approaching those of nature. In chronic, herpetic, and other cutaneous eruptions, the use of a preparation called *Feltz's Mixture* will often succeed after other remedies have failed. ℞ *Sulphuret of Antimony*, ʒiv.; place in a linen bag, and boil in water for one hour; then remove it, and place it in a vessel with *Sarsaparilla* in pieces, ʒiij.; *Isinglass*, ʒxiv.; *Water*, O. vj; boil down to one half, and strain. *Dose*, three glasses a day before eating. The treatment of these affections is now so well understood as to render any farther remarks upon the subject unnecessary.

A great variety of local treatment has been recommended for the cure of herpes, as chlorinated lime, chlorine, hydrocyanic acid, crea-

sote, soot, cyanuret of mercury, iodide of mercury, tincture of iodine, iodide of potassium, acetate of lead, cod liver oil, impure oxyde of zinc, &c. Where the vesicles are large, some advise to open them and apply an emollient cataplasm, and where there is much inflammation, a few leeches have been found useful; blisters have succeeded in checking their extension, and in severe cases may be resorted to with benefit. We have been accustomed to rely chiefly on general remedies in treating the various forms of herpes, and if these are properly adapted to the circumstances of the case, local applications will rarely be found necessary.]

Biblioc. and Refer. — *Celsus*, De Re Med., l. v., c. 28, § 4. — *Scribonius Largus*, De Com. Med., c. 99, 100. — *Plinius*, Hist. Nat., l. xxvi., c. 11. — *Oribasius*, Synopsis, l. vii., c. 33, 49.—*Aëtius*, Tetrab, serm. ii., cap. 40, p. 73. —*Avicenna*, Canon, l. iv., fen. iii., tr. i., c. 6.—*Schenck*, Obs. Med., l. v., p. 639.—*Tulpius*, Obs. Med., l. iii., c. 44. — *Zacutus Lusitanus*, Med. Pr. Hist., l. iii., n. 15. — *Ruland*, Cur. Emp. cent., cap. 39 (*Balsamum Sulphuris*). — *Turner*, Diseases of the Skin, ch. v., p. 80.—*Hoffmann*, in *Bergii* Institut. Med., t. ii., p. 34.—*Bergius*, in Eph. Nat. Cur., dec. ii., an. 3, obs. 171.—*Russell*, De Herpetibus, 8vo, p. 29. — *Lorry*, De Morb. Cut., vol. i., p. 182. — *Haller*, in Nova Comment. Goet., vol. viii., art. 4.—*Gilibert*, Adversaria Practica, p. 28.— *J. T. Klein*, Tentamen Herpetologiæ, 4to. Leid., 1755.—*Aaskow*, in Acta. Reg. Soc. Med. Haun., vol. i. (*On the impropriety of repelling herpes, and the internal disorders resulting therefrom*). — *Lettsom*, in Memoirs of Medical Society of London, vol. iii., art. 16.— *Adair*, in Edin. Med. Comment., vol. ix., p. 35 (*The arsenical solution recommended*).—*Hallé*, in Mém. de la Soc. Roy. de Méd., t. vii. (*Purgatives and warm bathing*). — *Home*, Clinical Experiments, *passim* (*Sarsaparilla —the elm bark*). —*Rahn*, Med. Briefw., b. i., p. 399 (*Decoctum dulcamaræ*). *Akerman*, in *Baldinger* N. Magazin, b. viii., p. 161 (*Elm bark recommended*).—*D. Lysons*, Farther Obs. on Calomel, &c., and on Elm Bark. 8vo. Bath, 1777.— *Roussel*, De Variis Herpetum speciebus, &c., 8vo, 1779.— *M. Poupart*, Traité des Dartres. 8vo. Paris, 1782.— *J. J. Plenk*, De Morb. Cutaneis. Vien., 8vo, 1783.— *Bertrand Lagrezie*, Sur le Traité des Dartres, 8vo. Paris, 1784.—*J. F. Carrere*, Traité de la Douce Amère dans les Dartres, &c., 8vo. Par., 1789.— *A. Dufresnoy*, Des Caract. Traitement., &c., des Dartres, &c., 8vo. Paris, 1798.— *P. G. Hensler*, De Herpete seu Formica Veterum, 8vo. Kiliæ., 1801.—*Chaussier*, in Recueil Périodique, &c., l. vii., p. 32.—*J. P. Frank*, De Cur. Hom. Morbis., l. iv., p. 142 — *Royston*, Medical and Physical Journal, vol. xxiii.—*Mackechnie*, Edinburgh Medical and Surgical Journal, vol. iii., p. 307.—*M. Hall*, in Ibid., 1820, vol. xvi., p. 62. — *T. Bateman*, Synopsis of Cutaneous Diseases, &c., 8vo, and Delineations of Cut. Dis., 4to.—*Serres*, Journ. des Hôpitaux, fol., p. 41 —*Geoffroy*, Rev. Med., t. x., p. 50 —*Evans*, Path. and Pract. Remarks on Ulcer. of Genital Organs. Lond., 1819. p. 27.— *S. Plumbe*, Pract. Treat. on Dis. of the Skin, 8vo Lond., 1824. p. 140.—*Velpeau*, Nouv. Biblioth. Méd., t. iv., p. 435. —*Louis*, Journ. Hebdom., t. vi., p. 361.—*Cazenave* et *Schedel*, Abrégé Pract. de Mal. de la Peau, 8vo. Paris, 182-. — *W. C. Dendy*, On the Cut. Dis. incident to Children, 8vo, 1837, p. 54.—*Rothalins*, in *Ferussac's* Bullet. des Sc. Méd., t. xxii, p. 105 — Journ. Hebdom., t. viii., p. 436. — Journ. Complem., t. xii., p. 448.—Rev. Med. Juin., 1830. —*A. T. Thomson*, Atlas of Delin. of Cut. Eruptions, 8vo. Lond., 1834, and art. *Herpes*, in Cyclop. of Pract Med., vol. ii., p. 420.—*P. Rayer*, Theoretical and Pract. Treatise on the Dis of the Skin; trans. by *R. Willis*, 8vo. Lond., 1835, p. 248.—*J. Green*, Pract. Compend. of the Dis. of the Skin, 8vo. Lond., 1835, p. 86.

[Am. Biblioc. and Refer.—*G. M. Gibert*, A Practical Treatise on the Special Diseases of the Skin, &c., 2d ed.; translated from the French by *Edgar Sheppard*, M.D Lond, 1845. — *Dunglison*, in Cyclopedia of Pract. Med., Am. Ed., art. "*Herpes*;" et The Pract. of Med., 2d Ed., 2 vols. Phil., 1844.]

HICCOUGH.—Syn. Ἀὐγξ, λυγνὸς, Hippocrates. *Singultus*, Pliny, Sauvages, Vogel, Sagar. *Lygmus*, Swediaur. *Pneusis singultus*, Young. *Clonus singultus*, Good. *Hoquet*, Fr. *Glucksen*, *Schlucken*, Germ. *Singhiozzo*, Ital. *Hiccough*, *hocket*, *hickup*.

Classif.—4. *Class*, 3. *Order* (*Good*). II. Class, III. Order (*Author*).

1. Defin.—*An uneasy sensation at the præcordia, followed by a rapid contraction of the diaphragm, of momentary duration, causing an audible inspiration, iterated at short intervals.*

2. i. *Description.*—Although hiccough is frequently symptomatic of dangerous maladies, and is even a fatal sign in these, yet it is occasionally the chief and primary disorder. When it is thus idiopathic, it is generally a slight and evanescent affection. It consists of a sudden and rapid contraction of the respiratory muscles, of the diaphragm especially, instantly followed by relaxation, thereby causing as rapid an inspiration, which is audible from its suddenness and force. These convulsive movements return at short intervals, and are attended by painful uneasiness at the præcordia and epigastrium, increasing with the frequency of the convulsive contractions and continuance of the disease.

3. ii. *Causes.*—Hiccough occurs frequently in infants and young children. It is not uncommon in aged persons; and, at these epochs, is generally symptomatic of irritation of the stomach or duodenum, or produced by a too precipitate deglutition, the movements which accomplish this process often taking place in an irritable or spastic manner in persons at the two extremes of existence. The arrest of the alimentary bolus in the œsophagus; an insufficiently masticated or dry state of the bolus; an irregular or precipitate performance of deglutition, especially when the stomach is empty or debilitated; the ingestion of highly seasoned or stimulating food or drink, or of cold fluids; laughter, particularly in hysterical females; long fasting and emptiness of the stomach; irritating or poisonous substances in this organ; worms in the digestive canal; and wearing strait-laced corsets, are the most common exciting causes of the less important and idiopathic cases of this affection.

4. Hiccough may be one of the forms in which hysteria manifests itself, particularly when hysterical patients have been subjected to mental emotions, as after crying or laughing. It may also follow a fit of cough or vomiting; or it may be produced by sudden frights. But in all these, debility, especially of the digestive organs, is a predisposing cause. It is often a symptom of irritation or inflammation of an adjoining viscus, particularly of the convex surface of the liver and of the stomach, especially at its cardiac orifice. It may arise from the passage of biliary calculi along the ducts, or from calculi in the kidneys, or in their passage into the ureters. Strangulation of internal parts, irritating matters in the colon, external injuries and fractures of the ribs, the various stages of pregnancy, and the suppression of accustomed discharges and eruptions, have severally produced it. Besides, singultus occurs in a great number of acute diseases and fevers, particularly towards the close of life. It usually attends fatal cases of inflammation of the abdominal viscera, and is generally present when hepatitis of the upper or posterior parts of the liver extends to the diaphragmatic peritoneum, or when abscess of this organ points upon the diaphragm.

5. When singultus occurs after a too full meal, or after the ingestion of cold or irritating fluids, which is very common, it is comparatively of little import, farther than that it

evinces a debilitated state of the stomach and increased irritability. But when it follows a meal either frequently or habitually, chronic inflammation of the stomach, especially about the cardiac orifice, or even of the œsophagus or duodenum, should be suspected; or irritation of the pancreas or biliary ducts, or worms in the alimentary canal may exist. When depending upon this latter cause, it sometimes alternates with sneezing and pruritus of the nostrils.

6. Authors have recorded numerous instances of hiccough continuing from two to three days to many months, or even longer, in some cases without any other very prominent symptom of disease; in others, alternating with sneezing, syncope, or hysteria. Various anomalous cases of this affection have been recorded by Poterius, Schenck, Bartholin, Alberti, Lanzoni, Hoffmann, Bauer, Pare, and others. Most of these have arisen from some permanent source of irritation, as biliary or urinary calculi; or have been one of the many manifestations of hysteria. The only instances of persistent hiccough that I have observed were referable to these sources, or to uterine irritation.

7. iii. The *lesions of structure* most frequently observed in those who have experienced this affection in a remarkable manner have been chiefly the following: The usual appearances and results of inflammation of the peritoneum, pleura, diaphragm, liver, stomach, or other adjoining viscera; encysted or other tumours connected with, or pressing upon the diaphragm or its crura; scirrus of the cardiac orifice of the stomach, or of the pancreas; morbid structures developed about the root of the mesentery; calculi, and abscesses in the kidneys, or calculi in the gall ducts; tumours pressing upon the eighth pair of nerves; and albuminous or other fluids effused into the sacs of the pleura, or into the peritoneum.

8. iv. Of the *diagnosis and prognosis* of singultus it is unnecessary to make any specific mention. The former is obvious; the latter may be inferred from what has been already stated. When hiccough is the primary disorder, and quite independent of internal inflammations, or of fever, a favourable result will generally follow, although it may be more than usually severe or frequent in its attacks. But when it is a symptom of these maladies, and appears at a far-advanced stage of acute or chronic diseases, it is generally a fatal indication. Cases, however, will occur in which the experience and pathological discrimination of the practitioner will be severely tried in giving an opinion as to the result.

9. v. *Treatment.*—The means of cure in this complaint should be selected with strict reference to the causes and pathological dependency of it.—*A.* In the *primary* or *idiopathic* forms of it, the administration of *opium* with *ether*, or of other *anodynes* and diffusible *stimulants*, and of refreshing alkaline beverages, will generally give relief. Various *antispasmodics*, volatile nervines, and sedatives, especially *camphor*, *ammonia*, *hyoscyamus*, *hydrocyanic acid*, either taken into the stomach, or inhaled into the lungs with warm vapour, will often remove the complaint. Idiopathic hiccough also may cease spontaneously; or it may be arrested by exciting some powerful mental emotion, as surprise, fright, &c., or by powerfully exciting the diaphragm by *sternutatories* or *emetics*; or by taking any substance in quantity into the stomach. When its continuance or severity requires medical interference, the pathological knowledge and diagnostic acumen of the physician are often put to the test, as either the absence of other symptoms, or their equivocal nature, renders it doubtful to what cause it should be assigned. In those cases the chest and abdomen ought to be minutely examined before any opinion is formed.

10. In obscure or doubtful cases, *camphor*, with or without the *nitrate of potash*; the *spiritus ætheris nitrici*, or the *spiritus ætheris sulphurici comp.*, or the *tinctura camphoræ composita* may be given with *demulcents*. The alkaline *subcarbonates* may also be exhibited with *hyoscyamus*, or with *colchicum*, *opium*; or the *hydrocyanic acid* may be given in an aromatic or gently tonic infusion. If there be reason to refer the affection to irritation in the kidneys, or in the biliary ducts, demulcents with camphor, and the *sub-carbonates of soda*, &c., will generally be of service. If it appear to depend upon worms, the treatment should be directed accordingly. When it is referrible to inflammatory action in the stomach or duodenum, full doses of *calomel*, with opium and small quantities of camphor, general or local depletions, according to circumstances, and cathartic enemata, are chiefly to be depended upon. Even in the more obscure and non-febrile cases which may resist soothing and antispasmodic remedies, *cupping* over the hypochondria, or along the vertebral column, as recommended by J. P. Frank, followed by *blisters*, *sinapisms*, *moxas*, the warm *turpentine epithem*, or other counter-irritants, in the same situation, may be prescribed. In cases where vascular depletion seems inadmissible, advantage may be derived from *dry-cupping*, as advised by Riedlin, Cleghorn, and Hufeland. Besides these, the tincture of *nux vomica* has been employed by Ranoe, and the *cajeput oil* by Vogel.

11. When this affection is merely a form of *hysteria*, or is connected with uterine irritation, *cold aspersions* of the surface; *refrigerants* with camphor, and the other means usually employed in that complaint are indicated. When it assumes a periodic character, the *sulphate of quinine*, and other preparations of bark, may be prescribed, with sulphuric acid, and sulphuric æther. Repeated doses of *magnesia* with *ammonia* and *aromatics*; the carbonates of *iron*, and other preparations of this metal; the subnitrate of *bismuth*; the various preparations of *zinc*; and, lastly, *electricity* or galvanism in the direction of the spine or diaphragm, have severally been recommended.

12. When hiccough is a distressing symptom about the fatal termination of disease, large doses of camphor, of ammonia, or of musk, and opiate frictions, &c., have generally been prescribed; but these can only palliate, and very frequently they are inadequate to accomplish this intention.

Biblioo. and Refer.— *Oribasius*, Synopsis, l. vi., c. 42.—*Aetius*, Tetrab. iii., serm. i., c. 5.—*Avicenna*, Canon, l. iii., fen. xiii., tract., v., c. 19.— *Rigaud*, Ergo Solvunt singultum Vomitus et Sternutatio. Paris, 1601.— *Zacutus Lusitanus*, Med. Pract. Hist., l. ii., p. 690.— *Hollerius*, De Morbis Internis, l. i., c. 32.—*Bartholinus*, Hist. Anat., cent.

ii., hist. 4. — *Riedlin*, Lin. Med., 1696, p. 276, et cent. i., obs. 15.— *Hoffmann*, Opera, vol. iii., p. 127.—*Alberti*, Casus Singultûs Chronici viginti quatuor Annorum. Halæ, 1743.—*Bonet*, Sepulchretum, l. iii., s. v., obs. 1, 2.—*Cleghorn*, Diseases of Minorca, p. 211.— *Z. Vogel*, Medic. u. Chirurg. Beobacht., p. 214.—*Morgagni*, De Sed. et Caus. Morb., epist. xxix., 3.— *Ranoé*, in Acta Reg. Soc. Med. Havn., vol. i., p. 460.—*M. Stoll*, Prælect., vol. ii., p. 153.—*Darwin*, Zoonomia, iv., i., 1, 7.— *Renauldin*, in Dict. des Sc. Med., l. xxi.—*Raige-Delorme*, Dict. de Méd., t. xi.—*Ashe*, Cyclop. of Pract. Méd., vol. ii., p. 424.—*Jolly*, Dict. de Méd. et Chir. Pract., t. x.

HOOPING-COUGH.—Synon. *Pertussis*, Sydenham, Huxham, Cullen, Darwin. *Tussis Ferina*, Hoffmann. *Tussis Convulsiva*, Sauvages. *Tussis Quinta*, Schenck. *Tussis Clangosa*, Bourdelin. *Tussis Delassans*, *T. suffocans*, *T. Amphimerina*, *T. Tussiculosa*, *T. Stomachalis*, *T. Spasmodica*, Auct. var. *Pneusis Pertussis*, Young. *Bex convulsiva*, Good. *Bronchitis Epidemica*, Marcus. *Bronchitis Convulsiva*, Prunel. *Bronchocephalitis*, Desruelles. *Coqueluche*, *Maladie Cuculaire*, *Toux Quinteuse*, Fr. *Keichhusten*, *Kikhusten*, *Krampfhusten*, Germ. *Kikhosta*, Swed. *Pertosse*, Ital. *Hooping-cough*, *Chin-cough*, *Kin-cough*, *Kinkhost*.

Classif.—2. *Class*, 3. *Order* (*Cullen*). 2. *Class*, 2. *Order* (*Good*). II. Class, III. Order (*Author in Preface*).

1. Defin.—*Convulsive and suffocative cough, accompanied with a reiterated hoop, or consisting of many successive short expirations followed by one deep and loud inspiration, and these alternating for several times; occurring in paroxysms, ending with the expectoration of tough phlegm, and frequently with vomiting; infectious, and often epidemic, appearing but once during life.*

2. M. Guersent defines hooping-cough to be a catarrhal affection of the air-passages, characterized by sonorous inspirations with imminent suffocation. The origin of this disease is obscure; for, if the ancients have at all observed it, they have not described it so as to enable us to recognise it. Doubtless new maladies may develop themselves in the progress of the refinements of society, and of the changes which the physical and moral world have undergone during a lapse of ages. This cannot be denied in respect of some of the exanthemata, or of diseases propagated by a specific virus, as smallpox. But, excepting these, it is difficult to admit that those maladies, the spread of which very much depends upon atmospheric vicissitudes, and epidemic constitutions, and upon general susceptibility of the species, can have been of modern occurrence entirely. It is not easy to conceive why a disease should not have, at least, occasionally appeared, since the circumstances favouring, and causes inducing it must have been in existence from the earliest ages. It may be said of hooping-cough, as of some other diseases, that, although the more exact observations and descriptions of modern observers have made it known only in comparatively recent periods, yet it may have existed nevertheless, and have been unknown from having been confounded with other maladies resembling it.

3. The passages in Hippocrates that may be referred to this disease are equally applicable to several other catarrhal affections or disorders of the respiratory organs. Some of the older writers take notice of epidemics, which have been considered to have been hooping-cough, especially those of 1239 and 1311; but they may have been severe catarrhal epidemics or influenza. Rosen thinks that pertussis passed from the East Indies and Africa into Europe, but of this he has furnished no satisfactory proof. According to Mezeray, it first appeared in France in 1414; and he has been generally considered as having given the earliest account or description of the disease; but, upon referring to this writer (*Abrégé Chron. ou Extrait de l'Hist. de France*, t. iv., p. 65), there is nothing but the name *Coqueluche* that is applicable to it. Indeed, his account would have been quite applicable to the influenza of January, 1837. The epidemics noticed by De Thou and Pasquier, to which the same name was given, and which occurred in 1510 and 1557, were evidently influenza, and not hooping-cough; and the same remark is applicable to most of the supposed epidemics of this latter disease during the sixteenth and seventeenth centuries.

4. Willis was the first who accurately described hooping-cough under the name of "Tussis puerorum convulsiva, sue suffocativa, et nostro idiomate *chin-cough* vulgo dicta" (*Opera Omnia*. Amst., 1682, vol. ii., p. 169), and it is only from his time that we have any account of the disease that can be relied upon. It was afterward noticed by Sydenham (*Op. Universa*. Lugd. Bat., 1726, p. 311), and by both it was treated of as a common disease. It is extremely doubtful that the epidemics of the fifteenth and sixteenth centuries, which proved so very fatal, were actually this complaint. The imperfect notices made of them convey nothing really proving that they were it. Rosen confesses that he cannot determine when pertussis first appeared in Sweden; and, as respects this country, there is no account earlier than that of Willis which can be received.

5. I. Description.—Hooping-cough, whether in an epidemic or sporadic form, presents nearly the same phenomena, particularly when it is simple or uncomplicated; but it is modified, in many respects, by the season, climate, constitution or habit of body of the patient, and by the complications which take place in its early stages. I shall, therefore, describe, first, its simple or uncomplicated form, and, secondly, the complications which it frequently presents.

6. i. Simple Hooping-cough—Pertussis has been divided into two stages by some writers, viz., the *catarrhal* and the *convulsive*; and into three by others, the second stage being divided by the latter into the periods of convulsion and of decline.—*A*. The *stage of development*, or the catarrhal period, is generally announced by some slight rigours or chills, turgescence of the face, slight redness of the conjunctiva, watering of the eyes, and the signs of simple coryza. There is scarcely any fever, sometimes only for twenty-four or thirty-six hours; but in some cases the fever is more marked, and it occasionally assumes a quotidian or tertian type. The cough is more or less frequent, comes on in fits, and may at this time be taken for common catarrh, or catarrhal affection of the trachea and bronchi. However, a slight shade of difference may be detected in the tone of the voice, which experienced observers will recognise as characteristic of the disease: The cough is more sonorous and more acute

than in bronchitis; expectoration is scanty, even with adults, and the matter brought up is limpid, as at the commencement of catarrhal affections. The anterior part of the neck is sometimes uneasy, or even painful, but in other respects there is little complaint, excepting a slight depression of spirits, moroseness, heaviness, diminished appetite, and sluggish bowels. This period generally continues from five to twelve days, and seldom more than fifteen.

[In fifteen cases of hooping-cough, Dr. Trousseau found the initial catarrh absent but twice; and in sixteen cases recorded by Valliex, catarrh was noticed in fourteen, these being all in which the early symptoms were particularly observed. There is a difference of opinion among pathologists as to the duration of this stage, some making it last from four to six days, while others assign it a much longer duration. Lombard states that, in an epidemic that occurred at Geneva, it lasted from one month to six weeks. In twelve cases observed by MM. Rilliet and Barthez, the hoop appeared on the first day once; the catarrh lasted six days in one case; seven days once; eleven days twice; fifteen days five times; thirty days once; and forty-five days once. In this country, the catarrhal stage averages about two weeks, the transition to the second stage occupying from four to eight days.]

7. *B. In the Convulsive, Spasmodic, or Nervous Stage*, the patients complain frequently of uneasiness or pain under the sternum; the fits of cough are longer, more frequent, particularly at night, and commence with unpleasant titillation at the larynx, during which the expiratory and inspiratory movements are irregular and incomplete, chiefly in very young children, who evince considerable dread of the attack. This state is attended with anxiety and a slight mucous rattle. On the accession of the fit, infants grasp persons or objects that are near them, or, upon awakening from sleep, start up. Each accession consists of a very dry, sonorous, spasmodic cough; the contractions of the respiratory muscles being so quick, and succeeding each other so rapidly, and attended with so much constriction of the larynx, that the patient cannot breathe, and seems almost suffocated. The face and neck are swollen, injected, and violet-coloured; the jugular veins are gorged; the eyes prominent, injected, watering, and the paroxysm terminates with one or two long, incomplete inspirations, attended with that peculiar noise from which the disease has generally derived its designation. Sometimes the fit of cough is interrupted during one or several minutes, and is resumed, but does not cease entirely until the patient rejects, by a sort of regurgitation, a ropy and limpid fluid, which comes partly from the bronchi, and partly from the stomach, as shown by the presence of portions of ingesta, and of bronchial mucus.* In some cases, when vomiting does not accompany the paroxysm, this particular fluid proceeds chiefly from the air-passages; in others, particularly in those accompanied with vomiting, it is chiefly from the stomach. It is sometimes sanguineous, either in streaks or specks; and when the paroxysms are severe, blood sometimes escapes from the nostrils, and even, in rare cases, from the ears and eyelids. The termination of the paroxysms is often attended by a watery secretion from the eyes. Crying, mental irritation, or opposition frequently brings on a fit; and even the sight of another in the paroxysm will induce it in those affected by the disease. The fits are generally much more severe after a meal, or after running, or other very active exercise. Their number varies with the severity of the disease, from five or six in the twenty-four hours, to one every ten or fifteen minutes; they are generally severer and more frequent during the night than in the day. [According to Rilliet and Barthez, the paroxysms lasted from one fourth to three fourths of a minute, and even two minutes; and there were often twenty paroxysms in the twenty-four hours, sometimes less, sometimes as many as forty-eight, and in one case seventy-two. Dr. Trousseau states that, in the first two or three weeks, the paroxysms go on increasing to a period corresponding to the twenty-ninth or thirty-eight day; they then remain stationary for a certain number of days, and then rapidly decline in frequency, being generally most frequent during the evening and night.] On applying the stethoscope or the ear to the chest, on the accession of the paroxysms, a mucous rattle may sometimes be heard; but frequently no unnatural noise can be detected, unless the disease is complicated with bronchitis. During the paroxysm the respiration is so far suspended as not to be heard in any part of the lungs; but at the moment of inspiration the air is precipitated by a loud, hissing sound, as far as the bifurcation of the bronchi, where it seems to encounter some obstacle, as it does not pass farther for one or two seconds. This stage usually continues from fifteen days to a month, or even longer. During its course, the fever, which had been either scarcely perceptible or but slight, but had been suspended after the invasion of the disease, is, in some cases, rekindled with more force, assuming the continued or intermitting type. It is chiefly during the early part of this stage that pertussis becomes complicated with, or excites bronchitis or other disease of the lungs. Yet such complications occur at various intervals from the attack, and sometimes even accompany the first stage. But it is generally during this period that affections of the head, or of the abdominal viscera, supervene, which, with lesions of the lungs, occasion unfavourable terminations. However, when the disease is slight and uncomplicated, it is without fever, the patients preserving their usual health and appetite, which may be even more craving than usual.

8. *C.* The *Stage of Decline* is of indeterminate duration, occurring from three to five weeks after the invasion of the disease, and continuing from twelve days to two or three months. It may be said to commence from the time of the paroxysms being more distant and shorter than in the preceding period, and by

* [The termination of the cough in vomiting is merely the result of the violence of the action which produces the cough: as soon as the muscular efforts have compressed the chest as far as it will yield, their force falls on the stomach; and in proportion as the cardiac orifice yields is the completeness of the act of vomiting. This disposition is increased by habit, and, consequently, as the disease advances the fits of cough often terminate, more frequently and speedily, by vomiting or retching.]

their termination, in the excretion of an opaque and thickish matter, as in the last stages of catarrh, and in the vomiting of alimentary matters. The fits become insensibly feebler during this stage; the cough gradually loses the characteristic hoop, and approximates nearer that attending the last stages of catarrhal affections. Sometimes the patient will remain for a day or two, or even longer, without cough; but on exposure to cold, change of temperature or weather, or after errors of diet, it returns with similar characters. In some seasons especially, as during autumn, and at other seasons on the occurrence of easterly winds, I have seen the paroxysms of cough return, with the same characters, after a fortnight, a month, or even two or three months, of perfect and apparent recovery.

[According to Dr. Lombard, the average duration of hooping-cough, as observed by him, was from fifteen to sixty-five days; the average thirty to forty days. The disorder among us lasts from one to five, and even twelve months, the average being about three; its duration being extremely variable, and depending much, we believe, on the mode of treatment pursued. Much also depends on the season of the year, it being always of longer duration in winter. The popular notion is, that it is six weeks in reaching its height, continuing for some time with little abatement, then declining and going off in six weeks more.]

9. ii. Complicated Pertussis. — Hooping-cough is frequently accompanied with, or occasions, in its severer forms, or in predisposed subjects, most serious affections. It may even attack patients already suffering or convalescent from disease; and although occurring under such unfavourable circumstances, may not be severe, and may terminate favourably, although in other cases it will often aggravate the pre-existing or accompanying malady—so much so as even to lead to a fatal termination. The complications of hooping-cough vary extremely, according to the season of the year, the state of the weather and atmospherical vicissitudes, the character of the prevailing epidemic, and the habit and temperament of the patient. They constitute the most important features of the disease, inasmuch as the danger depends entirely upon the particular form of complication present. The success, also, of the practitioner will mainly depend on the celerity and accuracy with which he may detect existing or incipient states of superadded or contingent disease, and the decision with which he may treat them. The importance of attending closely to the progress of hooping-cough, even in apparently favourable cases, must be apparent to those who have had occasion to observe how insidiously diseases of the substance of the lungs or of the brain have supervened and advanced even to an irremediable degree, masked by the cough, so as to have failed of attracting the attention of parents or those around the patient; or, if they have attracted notice, to have been mistaken for a symptom merely of the simple and less dangerous affection. I have frequently been called to children dangerously affected with disease of the lungs or brain, which had been in existence for many days before attention had been excited by it. Considering the complications of pertussis most important, I shall treat of them somewhat in detail.

10. Pertussis, in either an epidemic or sporadic form, particularly the former, sometimes follows rapidly upon measles. Occasionally it appears during convalescence from that complaint. In such cases, disease of the lungs, particularly bronchitis, pneumonia, pleurisy, tubercles, &c., often steals on without being suspected until it has made a formidable progress, or passed beyond the reach of aid. The previous disease, and the treatment employed for it, have often induced that state of the system which does not evince the complication by many of the usual symptoms which characterize it in the idiopathic or primary form; and it is chiefly by attentive observation of the pulse and respiration, in the intervals between the paroxysms, and of the expectorated matter, and by examining the state of the lungs by means of percussion and the stethoscope, that we can detect the complication or judge of its nature and extent. In infants with a narrow or malformed chest, there are often great dyspnœa, frequency of pulse and of respiration, sometimes even without much serious disease of the lungs, beyond slight bronchial irritation. The most common complications of hooping-cough, especially from two or three months old to seven or eight years, or later, are, *croup*, *bronchitis*, *pneumonia*, *pleurisy*, *pneumo-thorax*, *œdema of the lungs*, *hydrothorax*. In all these the respiration is difficult, frequent, and embarrassed; the countenance and extremities are turgid; and there is continued frequency of pulse. The expectoration terminating the paroxysms varies according as either of the above lesions is present. It is generally much diminished, and in proportion to the severity of the organic disease and of the accompanying fever. But the extent and nature of the complication should be carefully determined by the stethoscope and by percussion. In somewhat older children, and in those advancing nearer to puberty, who are of a scrofulous habit, and hereditarily disposed to phthisis, hæmoptysis, sometimes to a considerable extent, takes place, and in these subjects particularly tubercular disease of the lungs is not infrequently developed, either with or without hæmoptoe.

11. *B.* In infants and young children, the *functions of the brain*, and the symptoms indicating disturbance of this organ, should be carefully watched for, particularly those indicating *cerebral congestion*, *hydrocephalus*, *meningitis*, or *cerebritis*; and if any of these symptoms occur, and especially if attended by continued fever, by screaming, or by rolling of the head, or convulsions indicating meningitis or hydrocephalus; or by somnolency, falling of the eyelids, cool state of the skin, inability or disinclination to move or be moved, with dilated pupil, &c., indicating cerebritis, decisive treatment should be adopted, as recommended for these maladies.

12. *C. Diseases of the Abdominal Viscera* are much more rarely complicated with hooping-cough than those already mentioned; however, *diarrhœa*, chronic *irritation of the stomach and bowels*, *remittent fever*, *inflammation of the mucous surface* of these organs, are not infrequent attendants upon it. Sometimes, even, *inflammation of the peritoneum* and *mesentery* will occur,

during the advanced stages of hooping-cough, and I have occasionally, also, met with inflammation of the cæcum and colon, and *pericarditis*. These complications, particularly those of the digestive mucous surface, may superinduce others, as enlargement of the mesenteric glands, and affections of the cerebral organs, rapidly terminating in effusion.

13. With respect to all these complications, it may be generally remarked that they are attended by more or less fever of a continued or remittent type, and with paroxysms of cough more or less dry and severe. Sometimes the febrile exacerbations and remissions are well marked, especially when the complication is in the abdominal cavity. The expectoration terminating the fits generally diminishes as the complication increases in severity, and the vomitings often disappear. The paroxysms also are followed by more sensible prostration of strength. Having thus taken a general view of complicated pertussis, I shall next more particularly notice those complications which most commonly occur, and which frequently superinduce farther disease, especially in connected or associated structures.

14. *D. Pertussis associated with Bronchitis* is extremely frequent during spring and winter, and in this climate, especially in the months of February, March, and April, owing to the prevalence of easterly winds at that season. 1. It may precede hooping-cough; 2. It may be coeval with it; and, 3. It may supervene in the course of the disease. The last is most common. Whenever bronchitis appears, there are always decidedly febrile symptoms during the intervals between the paroxysms of cough. The breathing is also much accelerated, and, when examined by auscultation, is accompanied by the mucous rattle, and occasional temporary suspension of the respiratory sound in parts of the lungs, owing to the accumulation of the mucous secretion for a while in one or more of the bronchial tubes conveying air to those parts of the organ. The expectoration, also, from being clear, whitish, and ropy, becomes more opaque, less fluid, gelatinous, and less abundant. The paroxysms of cough are much more frequent, and often accompanied with a feeling of oppression in the chest, and are less constantly followed, or even not at all, by rejection of the contents of the stomach. The chest sounds well upon percussion, and the patient lies on the side most affected, or, in slighter cases, on either side. When the bronchi of both lungs are generally affected, he is unable to lie on either side, or is incapable of lying down at all.

15. This complication often terminates fatally, either from obstruction of the air tubes by the accumulation of tenacious mucus, together with spasm about the larynx, occasioned by the nervous character of the disease, and the irritation of the glutinous secretion, the patient dying asphyxied; or from congestion of the vessels of the head, owing to the paroxysms of cough, the obstruction produced by the mucus in the air-passages, and the difficult circulation through the lungs; or from the inflammatory action having extended to the trachea and larynx, or to the minute bronchi and substance of the lungs terminating in condensation, &c., of the structure of the organ, &c. In some cases, owing to the treatment employed and constitution of the patient, the acute form of the bronchial affection gradually subsides until it arrives at a milder state; when, owing to the incapability of the vessels to assume the healthy state, a chronic form of disease continues long afterward, which may be removed, in some cases, by judicious management; but which terminates in ulceration of the mucous membrane, or gives rise to tubercles, to chronic pleuritis, or other lesions in the thoracic cavity. This complication is frequent from six or seven months upward, and especially during the second, third, and fourth years of age.

[Rilliet and Barthez deny the constant presence of bronchitis in hooping-cough, and state that they found it alone or in connexion with pneumonia in only one half of the cases that proved fatal. The inflammation rarely consisted in redness of the mucous membrane alone, and it was most generally accompanied with continuous dilatation of the smaller air tubes. The existence and intensity of the bronchitis were in relation to the period at which the patient died. If death occurred on the 15th, 18th, 26th, and 27th days, there was no bronchitis; but it was constantly present when the malady was more prolonged. The same holds good in pneumonia; it was constantly found in those dying beyond the 27th day at the second stage, and sometimes the second and third stages. The two phlegmasiæ coincided, and it was difficult, during life, to indicate precisely the exact period of the invasion of the pneumonia. It was generally partial and lobular. MM. Rilliet and Barthez met with only one case of lobular pneumonia in a child that recovered; it occupied the summit of the left lung, and was developed at the end of three weeks.]

16. *E. Hooping-cough associated with pneumonia and pleuritis* is very frequent in the spring during easterly or northerly winds, particularly when these follow heavy falls of rain and open weather. It is more common in some epidemics than in others, and is met with at all ages, but most frequently from one to six or seven years or upward; and in children of a full habit of body, sanguine temperament, and strumous diathesis it may be nearly coeval with the pertussis; but it more commonly supervenes in the course of the disease, the inflammation commencing often as bronchitis, and extending in parts along the smaller ramifications of the bronchi, to the air-cells and substance of the lungs. In some cases, *pleuritis* supervenes to the pneumonia, and in others a portion of a whole lobe of the organ, and the pleura covering it, seem as simultaneously affected. It is very difficult to ascertain the existence of this complication in infants and very young children, but auscultation and percussion furnish considerable aid to the diagnosis.

17. The *Symptoms* of this complication vary according as the inflammation of the lungs and hooping-cough are coeval affections, or as the one may supervene to the other. When the affection of the lungs or pleura is present from the commencement, the cough occurs frequently, in short paroxysms, and is seldom followed by the rejection of the contents of the stomach. The pulse and respiration are quick, hard, full, and hurried; the alæ nasi and diaphragm la-

lour much during the respiratory motions, and the cough is without the attendant hoop, and does not terminate in vomiting, as the complication becomes developed. When it has been consequent upon the bronchial complication, wheezing and difficult expectoration are generally present; and the sputa become thick, opaque, glutinous, puriform, or streaked with blood. The prostration of strength is also great. There is a dull sound given out upon percussion of the thorax, over the seat of the disease. On examining the chest with the stethoscope, the signs enumerated in the pneumonia of children are more or less manifest (see art. Lungs—*Inflammation of*). When the *pleura* is implicated the cough is more suppressed, and pain is complained of in some part or other of the thorax; yet this latter symptom is not always prominent. In addition to the other stethoscopic signs, the metallic tinkling is often present. In the worst cases of this complication, as in those of the preceding, the lips assume a livid hue, and the extremities become cold, or even of a leaden colour. This complication often terminates unfavourably in a short time. During its continuance the hooping-cough presents characters much less distinct, but which become more pronounced as the inflammation is subdued.

[MM. Rilliet and Barthez deny the frequency of *emphysema* in pertussis, and they explain its rare occurrence by the mechanism of the paroxysms. Each spell consists of a series of expirations, followed by a single, long, whistling inspiration. This series of expirations empties the lungs, and thus acts in an inverse direction to the mechanical cause of emphysema. The long and whistling backdraught occurs during a spasmodic constriction of the larynx, trachea, and bronchi, which does not permit the air to go beyond the principal bronchial ramifications. The expulsion of air, and the incomplete access of air into the air cells during the paroxysm, are then the two phenomena which explain the absence of emphysema. In complicated cases it exists, but then to a less degree than when bronchitis and pneumonia occur alone; so that hooping-cough, so far from producing emphysema, tends to diminish the intensity of this lesion in the diseases which frequently give rise to it. Inflammation, according to these authors, is the sole cause of dilatation of the smaller bronchi; the phenomena of the paroxysm occur during expiration, and the strong inspiration admits air only into the large bronchi. (Clymer, *in Am. Ed. of* "Williams *on the Diseases of the Respiratory Organs*," Phil., 1845.)]

18. *F. Complications with tubercular Phthisis, hydrothorax,* or *pneumo-thorax* are rarely or never met with, unless as the consequences of one or other of the foregoing, or in the far-advanced stages of pertussis; and are therefore unfavourable terminations rather than complications of the disease, arising out of neglect or inappropriate treatment, or constitutional predisposition. The state of the expectoration and hectic symptoms, and the signs furnished by auscultation and percussion, will enable the practitioner to detect either of these terminations.

19. *Pertussis associated with inflammatory irritation of the Membranes or Substance of the brain, or occasioning Hydrocephalus,* is very common, particularly in infants about the period of dentition, or from six months to two or three years of age. In these, convulsions in various forms, spasm of the glottis, screaming, &c., are of frequent occurrence, and indicative of this complication, which is often more prevalent in some epidemics than in others. Congestion of the brain, owing to interruptions to the return of blood from it during the paroxysms of this disease, often terminates in effusion, capillary reaction, or even softening of parts of the organ. The spasms and convulsions which generally attend these affections of the brain in infants and young children rarely carry off the patient. They are rather the indications of that state of disease of the substance or membranes of the brain which terminates in softening of the central parts, and in serous effusion into the ventricles. Whenever the paroxysm of cough is increased in violence, the characteristic hoop disappearing, the face becoming very livid, and the thumbs drawn into the palms, cerebral congestion, with its attendants and consequences, should be anticipated. In some cases, but by no means frequently, the swelling on the tops of the fingers and toes, noticed by Dr. Kellie, and the crowing inspirations indicating spasm of the larynx (see Larynx) and threatening suffocation, are observed, generally at early stages of this complication. When the convulsions affect one side of the body more than the other, and especially if one side or limb be paralyzed, softening of some of the more central parts of the brain and serous effusion may be inferred.

[This complication was met with by MM. Rilliet and Barthez five times in twenty-nine cases, being more frequent in very young children. The eldest of these cases was five years old; the disease was severe in all. The hooping had been established from sixteen to thirty-one days; of seven cases, five succumbed, death immediately following the convulsions.]

20. In all cases of pertussis, when chills, followed by burning heat of the surface; pains of the head, with obscure redness of the conjunctiva; a fixed, brilliant, dry, and peculiar appearance of the eye; unusual redness or pallor of the face; very torpid bowels, with morbid excretions; irritability of stomach independently of the fits of cough; aversion from light or noise; heaviness or drowsiness and languor; grinding of the teeth; or sudden starting or shocks of the body in sleep; rolling or tossing back the head, and piercing screams are observed, then irritation of the brain or its membranes, which will soon pass into organic change and effusion, is manifestly present, whether there be convulsions or not. When stupor or unconsciousness has come on, with one arm waving in the air, or tossed over the head, while the other is paralyzed, a farther advanced state of disease than mere inflammatory irritation, as softening or effusion, may be inferred.

21. *H. Pertussis associated with Disorder of the Bowels, or with infantile remittent Fever,* is not infrequently observed. In these cases the abdomen is tumid, the evacuations offensive and unnatural, the breath is fetid, the tongue loaded, and the appetite is impaired. The

complexion is lost, and the eyes more sunk and heavy than in health. At last febrile exacerbations and remissions are observed, generally twice in the twenty-four hours; pickings of the nostrils and lips; the cough returns more frequently, and ceases to terminate in vomiting; the breathing is oppressed, hurried, and short; the expectoration, at the termination of the fits, is more scanty, but without the signs of bronchitis or of pneumonia; and emaciation proceeds. If this state of disorder continue, effusion in the ventricles of the brain may take place, or the mesenteric glands may become diseased. This complication steals on imperceptibly, and generally in the second or third stage of pertussis.

22. iii. *The Appearances observed in fatal cases of Pertussis* show the nature and extent of the complications, rather than of the disease itself. The accounts furnished us of the fatal epidemics in former ages, contain no details of the appearances after death; and even the more recent researches of Watt, Marcus, Waterton, Guibert, Desruelles, Guersent, and others, have thrown little light upon the nature of the malady, although they have illustrated the changes which often supervene in its course. The lesions which are most constantly observed, are more or less redness of the mucous surface of the trachea and bronchi, with considerable tumefaction of the glands at the bifurcation of the latter. These tubes contain a considerable quantity of a ropy or more or less thick mucus. In the bronchitic complication these changes are still more marked, and in infants the thymus gland is often unusually large. Inflammations of the lungs or of the pleura, or of both, in all their phases and stages, and effusions into the pleural cavities, with or without adhesions or false membranes, are not unusual, but are observed only in cases of the pulmonary complications described above. They are generally associated with muco-puriform matter accumulated in the bronchi, and splenification or condensation of several lobules or portions of the lungs.

23. When the disease induces chronic bronchitis or tubercular consumption, whether hæmoptoe has occurred or not, the mucous membrane of the bronchi has been found thickened, softened, rarely ulcerated in some points and injected, and tubercles have been observed in all stages of development and softening, and accompanied with ulcerated excavations. Tubercular changes are, however, not very common in young children. Dilatation of the bronchi is sometimes observed; but I have not met with it so often as Laennec believes it to occur. It is to be looked upon as a remote consequence of the disease in prolonged cases. M. Breschet observed, in two instances, injection of the pneumo-gastric nerves; but Marcus, Guersent, and myself have not found these nerves materially changed.

24. The morbid appearance found within the cranium have been chiefly consequent upon the cerebral complications, and have consisted of softening of the central parts of the cerebrum; effusion into the ventricles, or between and beneath the membranes; congestion of the vessels, &c. As far as my dissections have gone, inflammatory appearances have been observed in the medulla oblongata, or in its membranes, even when no other remarkable lesion was present within the cranium. Whether this change be a consequence of the disease or not, is difficult to determine; but there can be little doubt that those found in the brain are merely remotely consecutive lesions.

25. The stomach usually presents no particular lesion; but I have observed inflammatory appearances in the œsophagus, and the same have been remarked by Ozanam in his numerous dissections in the Foundling Hospital at Milan. I have likewise found the mucous surface of the pharynx and epiglottis, particularly the latter, more or less inflamed, and the subjacent cellular tissue, especially at the base of the epiglottis, infiltrated and œdematous. The mucous membrane of the intestines, particularly of the cæcum and colon, has been in some instances ulcerated, and the mesenteric glands engorged; but only in protracted cases passing into infantile remittent fever. From the numerous post-mortem examinations I have made, I am warranted in stating that most of the lesions observed by writers in this disease are merely effects of the complications of, and diseases excited by this complaint; and that the parts most constantly found altered are the mucous covering of the epiglottis, trachea, and bronchi; and of the pharynx and œsophagus; and, as respects the nervous system, the medulla oblongata and its membranes.

[According to Billard,* *post-mortem* examination has not revealed anything uniform in this disease, except bronchial catarrh in various stages of advancement, almost always accompanied with a considerable quantity of mucosity accumulated in the bronchi, which are sometimes sensibly dilated, and exhibit a vivid red colour. Among the concomitant lesions of the catarrh, Billard often met with inflammation of the lymphatic ganglia in the vicinity of the bronchi, and a dilatation of the termination of the bronchi, first noticed by Laennec. Sometimes he observed the bronchi unequally dilated, as in emphysema, and small vesicles at their extremities, filled with a creamy, inodorous pus. This able writer speaks of the disease as complicated with pneumonia, pleurisy, pulmonary tubercles, chronic enteritis, mesenteritis, meningitis, and hydrocephalus.

Dr. Mackintosh† states that he has examined the bodies of those who have died of this disease in fifty instances, and found the appearances very uniform, according to the period of the disease at which death took place. In ordinary cases, where death took place during the 2d, 3d, or 4th week, marks of vascularity and of venous turgescence were discovered in the head, and sometimes effusion of serum in the ventricles and between the membranes, but these were far from being invariable appearances. Other marks of sanguineous congestion were found in different parts of the brain. Traces of disease were invariably found in the thorax. In a few cases the lungs were somewhat collapsed, but in general they completely filled their respective cavities. In a few instances the pleura costalis was covered with

* ["A Treatise on the Diseases of Infants," &c., translated by James Stewart, M.D., New-York, 1839.]

† ["Principles of Pathology and Practice of Medicine," by John Mackintosh, 4th Am. Edition, with Notes by Samuel George Morton, M.D., 8vo, Phil., 1844.]

lymph-like and unctuous secretion. Once or twice the lungs adhered to the walls of the chest by an intermediate deposition of soft coagulating lymph. The anterior surface of the lungs, in almost all cases, presented spots of a whitish appearance, as if coated over with lymph; but this was found, upon closer examination, to depend on emphysema, air being effused beneath the pleura, from the rupture or enlargement of the air-cells; considerable portions were observed gorged with blood. Sometimes the substance of the lungs was in a state of œdema, and occasionally portions were observed inflamed. In persons who were not cut off till the 8th or 10th week, tubercles in various states were frequently observed; sometimes vesicular or crude, large and solitary, sometimes softened, and partly discharged by expectoration. Once or twice one lung was found infiltrated with a soft caseous matter. The bronchial glands were found enlarged if the patient did not die before the 3d or 4th week. The mucous membrane throughout the air passages always displayed more or less vascularity, which increased towards the ramifications, and the tubes were found filled with matter which had more or less resemblance to pus. This was also sometimes in the trachea and larynx. Occasionally flakes of coagulable lymph were observed, and ulcerations about the glottis, in the larynx and trachea, but more particularly at the great bifurcation (*loc. cit.*). The late Mr. Alcock, of London, states that he has repeatedly ascertained, by dissections of patients who have died of hooping-cough, that the larynx invariably exhibited signs of inflammation, often to so great an extent as, by its swelling, to close mechanically the glottis; often the exudation of coagulable lymph near the larynx, the mucous membrane of the trachea and bronchi much increased in vascularity, and the cavities of the latter filled with fluid more or less mixed with air; the appearance of the fluid varying from thin mucus to perfectly formed pus.—(*Med. Intell.*)]

26. iv. *Of the Nature and Seat of Pertussis.*—Sydenham imputed hooping-cough to the presence of a subtile and irritating vapour in the blood, affecting the lungs and exciting the paroxysms. Boehme (*Cur-Methode der Wichtigsten, Brust krankheiten*, Leip., 1788) conceived that it proceeded from a peculiar miasma acting chiefly on the nerves. Linnæus had previously referred it to the presence of minute insects in the air (*Dissert. Exanthemata Viva.*, Upsal, 1757); an opinion which was partially adopted by Rosenstein, who, however, believed that it was propagated by a morbific principle emanating from the affected, and passing into the system of those exposed to its influence by the respiratory organs and stomach; and hence the affection of those viscera, and the irritation of the mucous glands, occasioning an inordinate secretion of *phlegm*.

27. Waldschmidt (*Institut Medicinæ Rationalis*, 12mo, Marb., 1688), Stoll (*Ratio Medendi*, pars ii., p. 180), Danz (*Versuch einer Allgemeinen Geschichte des Keichhustens*, &c., Morb., 1791), Lentin (*Memorabilia*, p. 38), Friborg and Brouzet (*Sur l'Education des Enfans*, t. ii., p. 25) ascribed the disease chiefly to gastric disorder and saburra, while they admitted, particularly Danz and Lentin, that the lungs are also much affected, but in a sympathetic manner, and that the other symptomatic disorders accompanying it vary exceedingly, while the respiratory functions are more constantly disturbed. Chambon (*Des Maladies des Enfans*, t. ii., 8vo, Paris, 1799) and Tourtelle (*Elemens de Méd. Théorique et Pratique*, t. ii.) considered pertussis as a species of catarrh. The former located it in the stomach, and supposed that it is of an asthenic nature, the cough and other nervous symptoms being occasioned by the affection of this organ. The latter extended the gastric disorder to the lungs, and regarded the disease as a pituitous pneumo-gastric affection. A similar opinion was entertained, also, by Dr. Styx (Hufeland, *Journ. d. Pr. Arzneyk.*, b. vii., st. iv., p. 177). Gardien (*Traité des Mal. des Enfans*, p. 391) nearly coincided with Tourtelle in referring it to a nervous irritation, *sui generis*, causing a pituitous or increased mucous secretion from the bronchi and stomach, with convulsive action of the glottis and diaphragm, and believed that it differs from catarrh chiefly in its cause and the periodicity of its character. The opinion of Millot was not materially different from the foregoing. He referred the disease to a spasmodic irritation of the stomach primarily, and of the lungs symptomatically, and he imputed the cough chiefly to the convulsive action of the diaphragm; but he contended that the throat and bronchi are also implicated. M. Broussais has also argued that the source of the disease is in the stomach; but he considers that it consists of inflammatory irritation, producing an increased secretion of mucus, and that the termination of the fits in vomiting disembarrasses the affected surfaces and assuages for a time the irritation. He, however, admits that this affection of the stomach is not of itself sufficient to constitute the disease, but that it is always extended to the bronchi.—(*Ann. de la Méd. Physiol., Mai*, 1824.)

28. Besides those who have thus considered pertussis either catarrhal in its nature or allied to this state, others have conceived that it is chiefly of a nervous character. While the former have placed the most stress upon the catarrhal symptoms, particularly the discharge of a clear, ropy mucus, and the acceleration of the pulse in many cases, the latter have been more engaged with the convulsive features of the disease, especially the cough, its occurrence in fits, as in other nervous affections; and with the perfect, or nearly perfect, state of the functions during the intervals in the simple form of the disease. The opinions of Hoffman (*Opera*, Suppl. ii., pars x., p. 244) and of Hufeland (*Bemerk. ueber Blattern*, &c., p. 421) in this very nearly coincide. They both impute hooping-cough to irritation of the nerves supplying the larynx, air passages, diaphragm, and stomach; to an affection chiefly of the pneumo-gastric nerves. Hufeland supposes that the irritation of the nerves supplying the larynx and air passages is extended to the diaphragm by the intimate sympathy existing between these parts; that this muscle is thereby thrown into convulsive action; and that, owing to its action on the cardia, and the irritation extending to the stomach through the medium of the eighth pair of nerves, this organ undergoes energetic contraction, and evacuates its contents;

the vomiting thus occasioned removing the irritation of the respiratory organs, and thereby terminating the paroxysm. Thus, the vomiting is the antagonist of the spasmodic state of the organs of respiration; and, as observed in practice, a salutary occurrence. Very nearly allied to this opinion is that proposed by Jahn (*Ueber den Keichhusten.* Rudolstadt, 1808). He considers hooping-cough to be an affection of the phrenic nerves, occasioned by a peculiar miasm, too subtle to be recognised. Lobenstein-Lobel (*Ueber die Ang. Membr. den Keichhusten*, &c., 1811) contends that this disease originates in a peculiar affection of the nerves of the diaphragm; that in its second stage the phrenic nerves are in a state of irritation; and that in its third the irritation is expanded throughout the system; it thus commencing with a morbid affection of the diaphragm, which extends itself, by nervous connexion, to the rest of the respiratory apparatus and stomach, and sympathetically to the whole economy.

28.* According to Paldame (*Der Stikhausten.* Halle, 1805), hooping disease depends on exalted irritability of the lungs, and of the organs most closely sympathizing with them, particularly the diaphragm and stomach. Nearly allied with the foregoing opinions is that which has been proposed by Wendt (*Die Kinderkrankh. System.*, &c., 8vo, Breslaw, 1822). He arranges hooping-cough with nervous diseases; argues against the production of a secretion peculiar to it, yet imputes it to a certain miasm engendered by the nature of the season and constitution of the atmosphere, and thus prevailing generally in an epidemic form. The nerves which he considers chiefly affected are the branches of the intercostals, the eighth pair, and the recurrent nerve; the solar plexus he views as being consecutively affected. He contends that the disease is not a variety of bronchitis, as believed by many; and that the bronchi are only sympathetically irritated, and chiefly from the increased secretion of mucus and aqueous fluid poured into them during the paroxysm. He admits that it is generally accompanied with a phlogistic diathesis of the bronchi and substance of the lungs, but that there is no developed state of inflammation; this diathesis admitting, however, of inflammation being speedily kindled up from exposure to its exciting causes, and during certain epidemics; but when it exists, that it is merely a contingent complication.

29. M. Guibert (*Recherches Nouv. sur le Croup et sur la Coqueluche.* Paris, 1824) views pertussis as essentially nervous. He considers that a common cough may pass into this affection, by having the spasmodic state of the muscles of the larynx and of the diaphragm superadded to it; and, therefore, that spasm superadded to cough constitutes the disease, the state of spasm resulting from the high nervous susceptibility and particular disposition to it existing in children, and from individual idiosyncrasy. He supposes that, while the spasmodic state constituting the disease affects the muscles of the larynx and the diaphragm, in some cases this state is extended to the muscles of the head and whole body, occasioning general convulsions. The increased secretion of mucus he refers to an excited state of the mucous membrane of the air passages, and of the pharynx, œsophagus, and stomach, existing independently of any inflammatory action; and considers that the paroxysms of cough proceed from obstruction of the bronchi by the accumulation of this secretion; the nervous symptoms being the result of the spasm, which he considers the chief agent of the morbid phenomena. But this theory leaves unexplained the precise cause and origin of the spasm, which doubtless affects the parts to which he refers it.

30. According to M. Guersent (*Dict. de Méd.*, t. vi., p. 6), hooping-cough is a catarrhal affection, seated in the trachea and bronchi, consisting of a specific inflammation, accompanied with spasm of the trachea and glottis. To this opinion may be objected, that the causes of the disease are not always of a specific character; that, although it evidently is often propagated by infection, yet it frequently occurs sporadically, and then it cannot be traced to any specific cause. When, also, inflammatory appearances are observed in the air passages of some cases which have terminated fatally, these differ not materially from the changes occasioned by common inflammation.

31. Dr. Watt (*Treatise on the History, Nature, and Treatment of Chin-cough.* Glasg., 1812) considers the disease to be inflammatory, and seated in the bronchi. Dr. Badham and Marcus, of Bamberg, entertain the same view as Dr. Watt. Albers, of Bremen, denies hooping-cough to be essentially inflammatory. He justly states that it is never so rapidly developed as bronchitis; that it is an affection of the nerves of the chest, frequently occurring epidemically, and generally admitting of cure without the assistance of art, unless when appearing in a complicated state, or when inflammatory action supervenes in its progress: a termination which would but seldom occur if it were essentially inflammatory, and which seldom is observed to follow bronchitis or pneumonia when left entirely to nature. Thus, while Albers considers hooping-cough to be an affection of the nerves of the thorax, with which bronchitis is frequently complicated, Watt and Marcus conceive that it is a catarrhal bronchitis from its commencement. Nearly similar to the opinion of these two authors seems to be that of M. Fourcade-Prunet, who views it as a variety of bronchitis, without, however, stating in what the difference consists. The convulsive paroxysms of cough he attributes to the morbid sensibility of the mucous membrane of the air passages in their inflamed state, and to the irritation occasioned by the respired air and the secretion formed on this membrane. M. Boisseau (*Dict. abrégé des Scien. Médicales*, t. v.) entertains a similar opinion to that of M. Fourcade-Prunet; and Dr. Dewees (*A Treatise on the Physical and Medical Management of Children*, 8vo. Phil., 1825) contends that it is a catarrhal inflammation of the respiratory mucous membrane, with an augmented secretion of mucus. Dr. Dawson (*Nosol. Pract. of Physic*, 8vo. Lond., 1824) also believes in the inflammatory nature of the disease, but confines its primary seat to the mucous membrane of the glottis. Laennec regards it as a variety of pulmonary catarrh, holding an intermediate grade between the pituitous and the mucous catarrh; and he denominates it, from the convulsive character of the cough,

convulsive catarrh. The expectoration he considers to be, at the commencement, pituitous, and towards its close nearly mucous. The absence of respiratory sounds during the paroxysms he explains by supposing either a momentary congestion from blood or serum, giving rise to a tumefaction of the mucous membrane sufficient to obstruct the bronchi, or to a spasmodic constriction of these tubes.

32. Dr. Webster (*Med. and Phys. Journal*, Dec., 1822) contends that the symptoms, when closely viewed, warrant the conviction that hooping-cough depends upon inflammatory irritation of the brain, or of its membranes, or of both. A somewhat similar opinion had been given by A. Leroy (*Méd. Maternelle*, 8vo, Paris, 1803). Boisseau, Otto (*Nye Hygæa*, August, 1824), and Begin (*Traité de Therapeutique*, &c., t. ii., 8vo, Paris, 1825) had admitted the frequency of the association of cerebral affection with hooping-cough, even from the commencement; while they oppose the inference that the latter is dependant upon the former. Dr. Webster is, however, the first writer who fully appreciated the influence of cerebral irritation on the respiratory organs in this disease, and excited attention to an important and early complication of it.

33. M. Desruelles states that hooping-cough is an inflammation of the bronchi, giving rise, at an early period of its course, to cerebral irritation; that, as long as the bronchitis is simple, the cough is not attended by the characteristic hoop; but that, when the cerebral irritation commences, the diaphragm and muscles of the larynx, &c., become subject to convulsive actions, which impress the cough with its peculiar features. The arguments already adduced against the inflammatory origin of the disease are equally applicable to this view; and the constant existence of cerebral irritation is by no means proved, the occasional supervention of this irritation being all that is fully ascertained.

34. From my researches into the pathology and treatment of hooping-cough, during some years previously to 1823, I was led to consider the medulla oblongata or its membranes very early implicated in this disease, evidences of inflammatory irritation of these parts having been very generally observed in the *post-mortem* inspections I had made. I conceived that the morbid impression or irritation occasioned by the exciting cause in the upper parts of the respiratory surfaces, particularly the glottis and its vicinity, affects the respiratory nerves, especially the pneumogastric; and that the irritation is extended to the origins of these nerves, where it aggravates and perpetuates the primary affection. Where no predisposing, concurrent, or consecutive causes or influences favourable to the development of inflammatory action, either in the respiratory organs or in the brain, exist, the morbid action does not proceed beyond an irritative state, and the disease preserves a simple form. But when such causes are in operation, the irritation passes into inflammatory action in either of these situations; in some cases extending from the epiglottis and pharynx to the bronchi and lungs, and in others from the medulla oblongata to the brain or its membranes. As the irritation increases or extends downward along the respiratory surfaces on the one hand, or to the pharynx and gastric mucous surface on the other, and as it predominates in the one above the other, so does the disease assume more of a bronchitic or of a gastric character, the latter form being the most favourable, as tending to disembarrass the bronchi, and to prevent the extension of disease in that direction. When the disorder implicates the lungs, the gastric affection either does not appear, or is thereby superseded; and when the brain becomes affected, either the gastric symptoms are not observed, or they assume different characters, appearing in the intervals between the fits of cough, instead of terminating the fits, and the cough loses its convulsive or nervous form. It does not, however, follow that the stomach is materially affected, even when the vomiting is the most remarkable. In these cases the irritation seldom extends much beyond the pharynx; the irritation of this part and of the epiglottis, and the convulsive nature of the cough, being the principal causes of the vomiting. The copious discharge of ropy mucus terminating the fit partly proceeds from the pharynx and vicinity, even when there is no vomiting. Attentive observation subsequently to the adoption of these views, and extensive experience of the treatment founded on them, have confirmed my confidence in their accuracy in the principal points.

35. I believe that the disease is chiefly nervous in the simple cases; that it preserves this character more or less throughout, even when inflammatory complications ensue; and that, in the uncomplicated state, the nervous affection never proceeds beyond irritation. The impression made by the causes is followed by functional lesion of the respiratory nerves, particularly the nervus vagus; and, owing to this lesion, the mucous surfaces they supply frequently experience consecutive changes, as respects the state of circulation, exhalation, and secretion. Hence result increased vascular determination and augmented secretion, attended by irritation of the glottis, epiglottis, pharynx, and air tubes, inducing convulsive action, which supervenes the more readily, as the disease is essentially nervous in its nature, but often becoming, consecutively, irritative or inflammatory; this last characteristic being only an occasional complication, occurring from predisposition, habit of body, epidemic influence, or fortuitous causes favourable to its development. The inflammatory appearances in the medulla oblongata and base of the brain may be owing to the functional relation of these parts to the respiratory order of nerves, which receive the first impression of disease, and whose functions are so manifestly disordered throughout, as noticed above (§ 7); or these, as well as the consecutive cerebral complications, may be induced by the disposition to disordered circulation, occasioned by the change in the state of nervous influence, and perhaps still more by the impeded return of blood from the brain during the paroxysms. The vomiting so generally terminating the fit has been, as I have shown, imputed by many primarily to the stomach. But this symptom is often attendant upon severe fits of cough, whenever the epiglottis suffers unusual irritation. As it does not occur during the first days of the complaint, it seems to be owing to irritation of this

part, which has been gradually coming on with the progress of the disease, until it reaches a pitch occasioning increased convulsive action of the respiratory muscles, extending to the diaphragm, the abdominal muscles, and stomach, the irritation of the morbidly sensible epiglottis by the cough increasing the paroxysm until vomiting is produced.

[In reference to these different views, Dr. Williams (*A Practical Treatise on the Diseases of the Respiratory Organs*. Phil., 1845) thinks that, in many instances, they do not sufficiently regard the physiological character of those morbid motions which form the chief feature of hooping-cough. "Thus," he remarks, "we find much ascribed to the phrenic nerve and diaphragm, when it is obvious that these agents of inspiration are little, if at all concerned in the motions which constitute the cough. We regard hooping-cough as originating in a specific irritation (almost always inflammatory at first) of the lining membrane of the upper portion of the air passages. This irritation is, in the first stage, constant, and accompanied with cough and expectoration, like those of common inflammatory catarrh; but in the second stage it peculiarly increases the irritability of the laryngeal, constrictor, and bronchial muscles, and of the nerves which excite the contractions of these as well as of the expiratory muscles, which are sympathetically associated with them; those, in fact, which are concerned in the act of coughing" (p. 492).

We are not aware that any new light has been thrown upon the true pathology of hooping-cough in this country, and undoubtedly as great diversity of views exists in relation to it here as among the European faculty. Dr. Dewees, as Dr. Copland observes, regarded the disease as consisting in "an inflammation of the mucous membrane of the organs of respiration, occasioning an increased secretion of fluid, which, accumulating, acts as an extraneous substance, and brings on the cough for its expulsion."

Dr. Stewart regards the disease "as inflammatory in its first stage; or, perhaps, a complication of inflammation with some inexplicable action of the nervous system, which modifies the simple bronchitis," but "in the last stage purely spasmodic" (*A Practical Treatise on Diseases of Children*. New-York, 1841). Dr. Condie supposes the essential symptoms of hooping-cough to be the result of a spasmodic closure of the glottis; but whether this is owing to an irritation seated in the larynx and trachea, or in the brain, he thinks it difficult to determine. "In the greater number of cases," he remarks, "the disease commences as a simple, and often very mild bronchitis; and it is not until after the bronchial irritation or inflammation has existed for some time that the irritation is transmitted to the laryngeal nerves, and the convulsive cough and difficulty of respiration occur" (*On Diseases of Children*. Phil., 8vo, 1844). Dr. Gerhard considers this an affection of the nervous system, accompanied by bronchitis, in which sometimes the one, sometimes the other predominates; the affection of the nervous system being, in some cases, very severe, with but little cough, whereas the cough is frequently very bad, with comparatively slight nervous symptoms" (*Lectures on the Diagnosis, Pathology, and Treatment of the Diseases of the Chest*. Phil., 1842). The late Dr. Hosack regarded hooping-cough as essentially an inflammatory affection, and his treatment, which was decidedly antiphlogistic, was founded on this pathology. It is believed that few practical observers regard the disease as a pure neurosis, or as purely inflammatory, although the phenomena observed during life might lead to the former, and the organic changes noticed after death to the latter opinion. The cultivation of morbid anatomy has led to a modification of views once entertained in relation to the pathology of this, as well as numerous other diseases; for few, perhaps, with Hufeland, Jahn, and Cullen, notwithstanding the convulsive nature of the symptoms, will attribute the disease to an irritation of the eighth pair and the phrenic nerves, while positive marks of inflammation, to a greater or less extent, invariably exist in the lungs and air passages. When to this we add the well-known fact that symptoms of catarrh, or inflammatory disease, precede, for some time, the characteristic cough, and that, both during this period and afterward, in the intervals of the fits of convulsive coughing, the mucous wheeze, and occasionally the other rhonchi which distinguish pulmonary catarrh, are perceptible, we shall no longer hesitate to adopt those views as to its pathology which are held by a large majority of the medical world, namely, that it is a nervous affection, generally complicated with bronchitis or pneumonia, although, in some instances, it may exist without them.]

36. II. Diagnosis.—The existence of this complaint, particularly at an early stage, is not always readily ascertained. During the first period it is not easily distinguished from a common cold. In most instances, however, the more paroxysmal nature of the cough, and the absence of fever, will indicate the affection, although the characteristic hoop is wanting. Occasionally this sign is absent altogether in the slightest cases, although the disease is prevalent in a family, and yet there may be little doubt of the nature of the cough. Its more or less convulsive form, the perfect intervals, the evidence of congestion towards the head during the fit, and, as the complaint advances, the copious discharge of ropy mucus, are quite distinctive, although there is no complete hoop. When this latter sign is present, or when the paroxysms of cough terminate in vomiting, there can be no doubt as to the disease.

[We do not regard the *hoop* as characteristic of this disease, neither its absence disproving the existence of the affection, nor its presence absolutely proving it. We frequently meet with the hoop in ordinary catarrh, especially in children who are teething; and MM. Rilliet and Barthez point out (vol. ii., p. 224, *et seq.*) two diseases of very different characters, each of which may be, and often is, confounded with hooping-cough. Acute bronchitis, attended with cough recurring in paroxysms, is one of these diseases; the other is tubercular degeneration of the bronchial glands. The former of these affections may be distinguished from hooping-cough by the general absence of a catarrhal stage introducing the paroxysms of cough; by those paroxysms being usually

shorter, less intense, often unattended with hoop, or, at any rate, accompanied with a very rare and indistinct hoop, and without expectoration or vomiting. It is associated, from the commencement, with intense fever and accelerated respiration, a small pulse, anxious countenance, and extreme dyspnœa, and tends rapidly to a fatal termination. Tubercle of the bronchial glands may be distinguished by the paroxysms of cough being usually very short, and unattended either with hoop or with mucous expectoration, or with vomiting. In its course, too, attacks of asthma often occur, which alternate with the paroxysms of cough. It is frequently attended with alterations in the character of the voice, and is associated with hectic fever and night sweats, and may be farther recognised by the physical signs of tubercular disease.]

37. III. Prognosis.—When the complaint is simple, the prognosis is favourable; but it may, at first, assume this form, and afterward become complicated, and consequently more or less dangerous, owing to injudicious management, to various influences, and to its continuance; therefore a cautious or reserved opinion should be given as to the result in all the early stages. The complaint is, generally speaking, more dangerous the younger the child; but the period of dentition aggravates the risk. When, however, the infant has a healthy nurse, and is itself of a good constitution; if it have not recently suffered from any infantile complaint, or been lately weaned; if the attack commences in summer or spring, or in a mild, dry season; if the intervals be complete, and of considerable duration; and if the paroxysms be attended by vomiting and a free excretion of mucus, a favourable prognosis may be entertained. If the lungs or the head, the latter especially, betray disorder; if the child belong to consumptive, scrofulous, or old, asthmatic parents; if there be tendency to cerebral diseases in the family, a cautious or an unfavourable opinion should be given. All the symptoms indicative of the more serious complications (§ 10, 11) are signs of danger. Upon the whole, the complaint is more favourable in adults than in infants, or even than in children; yet there is great risk, even in them, of the occurrence of pneumonia, bronchitis, or pleuritis; and, in young adults of a scrofulous diathesis, of phthisis, or of hæmoptysis. It may cause abortion in pregnant females; and in those who are hysterical the cough may ultimately pass into an obstinate form of that complaint, and be removed with difficulty, especially if the circumstance be overlooked. The occurrence of the complaint during convalescence from measles or scarlatina is unfavourable, inasmuch as bronchitis and the other pulmonary complications are apt to ensue. The presence of cerebral symptoms, or of fever or a quick respiration in the intervals, and a scanty excretion of mucus after the fits, indicate danger.

38. IV. Causes, &c. — *Of the causes and modes of propagation of hooping-cough* we have no very positive knowledge. The disease occurs either epidemically or sporadically, and often during seasons and under circumstances wherein catarrhal and pulmonary affections prevail. When it commences in autumn or winter it is always of longer duration than at other seasons; and, like other catarrhal complaints, it is often prevalent in spring and summer. It generally affects several or many at the same time, particularly infants from two or three weeks old and upward, and children till after the second dentition. It sometimes occurs in adults, and but rarely in the aged. Among adults, females are oftener attacked than males: those of the latter who are nervous, irritable, or approach the nearest to the female constitution, being the most susceptible of it. It affects persons only once, but rare instances of second attacks have been observed.

["I have known pertussis to occur," says Dr. Francis, "within the first week of infant life and prove fatal; and I have been made acquainted with three instances of the disease occurring in male subjects of advanced age. In one, aged 86 years, the disorder, strikingly characteristic in its symptoms, terminated life after about ten days' duration. In the second case, the patient, aged 60 years, had suffered repeatedly from bilious remittent fever. When hooping-cough set in, the patient had been for some twelve months exempt from febrile annoyance. The paroxysms of the hooping-cough after the first few days became exceedingly severe, and were accompanied with great cerebral irritation; the disorder finally terminated in congestion of the brain and paralysis of the right extremities, with loss of speech, coma, and death. The third case was that of a female aged about 62 years. Like small-pox, measles, and scarlet fever, its occurrence in some individuals a second time is occasionally to be met with."]

39. Hooping-cough, independently of its epidemical appearance, seems to possess infectious properties, which, although admitted by the majority of authors, have been disputed by a few. It is always quickly propagated through a family, and its extension, when sporadic, may be prevented by removing the unaffected children. Mothers, nurses, and even fathers, who have not had the disease, will often contract it from their children; and I have known mothers who had had it in their childhood affected a second time by a child at the breast, or by its prevalence among the other children. Its infectious properties are farther shown by a child having caught it from others, at school or at nurse, and, when removed under the disease to a distant part of the country, and into a family where it did not exist, communicating it readily to those who had not had it. Like all infectious maladies, it is much more rapidly propagated during certain constitutions of the air, particularly those in which catarrhal complaints are frequent, or when measles prevail, than in others. In its epidemic form, its infectious property appears to be most fully marked, from the circumstance, probably, of the concurring causes, whatever they are, being then more active, as well as from the predisposition these epidemic states occasion. Pertussis has also been frequently observed to follow epidemically upon epidemic morbilli. When it occurs sporadically, and during healthy states of the atmosphere, it often fails to be propagated, unless to those most predisposed. Moreover, it is often necessary to infection that the breath of the affected subject should be inspired by the unaffected, and that the disease should, at

the time, be fully developed. The infectious property seems to diminish as the disease declines. Dr. CULLEN and many others believed that it disappeared in from four to six weeks; but, as Dr. ELLIOTSON remarks, the period cannot be fixed with any precision. It is generally from five to seven or nine days, or even longer, after exposure to infection, that the cough commences.

[During the sixteen years from Jan., 1819, to Jan, 1835, there were 1400 deaths in the city of New-York from hooping-cough, being to the whole number of deaths in the ratio of 1 to 64·4.

In the city of Philadelphia, during the six years preceding 1840, of the 24,738 deaths among children under 15 years of age, 606 were of bronchitis, 617 of croup, 800 of pneumonia, and 511 of hooping-cough. Of the latter, 242 were under 1 year, 135 between 1 and 2, 112 between 2 and 5, 21 between 5 and 10, and 1 between 10 and 15 years. Dr. DEWEES is inclined to believe that the hooping-cough depends on causes of a more general and pervading influence than contagion, in other words, that it is meteoratious; and mentions the fact that the disease suddenly broke out on Block Island, and prevailed extensively without the inhabitants of the place having had any intercourse with an infected source. "It is a rule," says Dr. D., "with few or no exceptions, that where a disease can be traced to atmospherical influence, it does not prove contagious. Nature, indeed, can hardly employ two such opposite causes to produce the same effect."]

40. V. TREATMENT.—There are few maladies against which a greater array and variety of means, both medicinal and regimenal, have been recommended than against hooping-cough. Vascular depletion, emetics, purgatives, diaphoretics, antispasmodics, excitants, internal and external irritants, &c., have been severally prescribed as unfailing agents, and combined in infinite forms in the treatment of this complaint. Although these may be extremely beneficial, they may be also most mischievous, success entirely depending upon their application appropriately to the peculiarities of individual cases. As the disease is variously modified and complicated, so it cannot be removed by a particular class of remedies, or by a specific form of treatment. Means inappropriately employed may convert a simple and slight case into one both complicated and dangerous. There are certain considerations requisite to a successful treatment of this complaint; and these should always be kept in view, not only in it, but also in all other epidemic maladies. I refer especially to the constitution and habit of body of the patient, to the character of the prevailing epidemic, to the nature of existing complications, and to the period and progress of the disease. It is owing to these circumstances that the means which are beneficial in one case, or in one season, are often injurious in others. Thus the epidemics of spring or winter more frequently require vascular depletion than those of summer and autumn, while these latter derive more benefit from emetics than the former. So important are the complications of pertussis, that the treatment should be mainly directed to their prevention or removal; and whatever they may be—whether bronchitis, pneumonia, congestion or inflammation of the brain, &c.—it should be recollected that they are much more dangerous than when occurring primarily or in a state of previous health, unattended by the aggravating circumstances of this complaint.

41. i. *Treatment of Simple Hooping-cough.*—In the slighter cases little more is required than attention to diet, regimen, and the excretions, unless the child be plethoric, when additional means will be necessary.—*a.* In the *first stage*, a dose of *rhubarb* with *hydrarg. cum creta* or *calomel*, and a little *ipecacuanha*, may be given every night, occasionally interposing an *emetic*. The *diet* should be farinaceous, with milk. The child ought to be confined to a mild, equable temperature, and wear flannel next the skin in winter, spring, or autumn. If the patient be plethoric, it will be proper, as a precaution, to apply *leeches*, according to his age, either behind the ears or over the sternum, as the head or respiratory organs may indicate a disposition to be affected. In the more severe attacks, also, this measure should never be neglected; and *diaphoretics*, with small doses of *antimony*, or of *ipecacuanha*, ought to be given every four or five hours; the secretions and excretions being duly promoted by calomel and rhubarb every night, and a stomachic *purgative*, or an emetic, each second or third morning, according to circumstances.

42. *b.* In the *second stage* of simple pertussis, an *anodyne* may be added to the diaphoretic mixture, and taken every four hours. If no sign of cerebral or pulmonary affection appear, the *hydrarg. cum creta* may be substituted for calomel in the night powder. It is in this period that the treatment recommended by Dr. PEARSON is most serviceable. This consists of an antimonial *emetic*, followed by a draught containing a drop of tincture of *opium*, five drops of *ipecacuanha* wine, and two grains of *carbonate of soda*, for a child of one or two years of age. This draught is to be repeated every four or five hours for several days, the bowels being kept open by rhubarb and calomel. As the cough declines, he lessens the opiate, and gives *myrrh* in place of the ipecacuanha wine. This treatment is excellent for children of three or four years of age or upward; but, until they reach two or three years, opium ought not to be given. For those of the age mentioned by Dr. PEARSON, I consider the extract or sirup of *poppy*, or *conium*, or *henbane*, to be preferable. The *liquor potassæ*, also, will be often advantageously substituted for the soda. The *decoctum senegæ*, or the *infusum valerianæ*, may be given in this and the next stage with some aromatic water, and an antispasmodic. It will be sometimes of service, even in this stage, to exhibit an *emetic*, if the fits do not terminate in vomiting; and, unless the attack is slight, the same *diet* and *regimen* as directed in the first stage should be continued in this. A principal indication in both is to watch the first sign of visceral disease, and to oppose its accession by leeches applied in either of the situations just named, and by emetics. In both periods, also, advantage will accrue from the warm semicupium or pediluvium at bedtime; but, unless the case become severe, it will only be occasionally required. The excretions should always be promoted by mild and stomachic purgatives.

43. *c.* In the *third stage* the chief indications

are to strengthen the system, and to supersede the convulsive character of the affection by giving *tonics* with *antispasmodics* and *anodynes*. The gentler tonics may be first employed, and successively those which are more energetic, in conjunction with preparations of *poppy*, or with *paregoric*, or with *conium*, *hyoscyamus*, *laurel water*, &c. There are numerous medicines belonging to these classes that may be given with great advantage in this stage, but they will be noticed hereafter. *Tonics*, as well as antispasmodics or anodynes, will be advantageously exhibited with the *alkaline subcarbonates*, or with *liquor potassæ*, or BRANDISH'S alkaline solution, and *purgatives* beneficially conjoined with vegetable bitters or other tonics. If the disease assume a periodic or intermittent type, the preparations of *bark* or *quinine* should be prescribed. It is principally in this stage that *change of air* proves so serviceable. It should not be neglected, particularly when this period and convalescence are protracted. In both this and the preceding stage *embrocations* or *liniments* of a rubefacient and antispasmodic kind (see *Append.*, F. 295, *et seq.*), applied to or rubbed upon the spine, will prove very serviceable. *Sinapisms* will also sometimes be of use, especially in threatened bronchitis; and, in young, delicate, or irritable children, are preferable to blisters and the tartarized antimonial ointment, from which I have seen dangerous consequences accrue in patients of this description.

44. ii. *Complicated Hooping-cough.*—*A.* The most common complication is with *inflammation of the bronchial mucous membrane*. But this may not be the only associated inflammation; for *pneumonia*, or *pleuritis*, or even both, may be superadded to it: a contingency to which the practitioner should be always alive. If *simple bronchitis* (§ 6) be alone present, *local depletions*, in addition to the treatment already directed, must be prescribed; and *antimonial wine*, with the solution of the acetate of ammonia and camphor julap, should be taken every third or fourth hour. In young children, however, ipecacuanha wine should be preferred to antimony. A small dose of calomel, with or without ipecacuanha, rhubarb, or julap, may be given every night, or night and morning, according to circumstances; guarding, however, against too great an action on the bowels. After depletions have been sufficiently employed, *sinapisms* or *blisters* applied for a few hours, or until erubescence of the surface is produced, and then followed by warm poultices, will be very serviceable. The warm *semicupium* may also be resorted to at bedtime. An ipecacuanha *emetic*, when expectoration is difficult, or twice or thrice a week, will also be beneficial. After the inflammatory symptoms are removed, any of the *anodynes* recommended above may be added to the diaphoretic mixture, an *embrocation* or *liniment* (F. 297, 300, 311) applied along the spine, and the complaint treated, in the *second* and *third stages* especially, as advised for the simple disease.

45. *B.* In the complication with *pneumonia* or *pleuritis*, or with both (§ 14–18), more decided *depletion* will generally be requisite than in the bronchitic form. But it must not be overlooked that these inflammations are seldom present in pertussis without more or less bronchitis. In this, as in the other pulmonic complications, *cupping* over the sternum, or between the shoulders, is a preferable mode of depletion to the application of leeches; and, in a far advanced stage of these inflammations, either after blood has been freely abstracted, or when excessive secretion into, or accumulation of viscid fluid in the bronchi threatens suffocation, *dry cupping* between the shoulders is the next efficient means to a stimulating emetic. A purplish hue of the lips or cheeks, and dilatations of the nostrils, should not prevent depletion if it is otherwise indicated, particularly in plethoric children, if it have not already been practised, and if the skin be hot and the pulse not much reduced in strength. When the substance of the lungs or pleura becomes inflamed, *calomel*, with or without ipecacuanha, should be given in larger and more frequent doses than when the bronchi only are implicated, and the diaphoretic mixture should contain an antimonial preparation. This last, however, ought to be given with caution in infants or young children, for I have seen most serious effects produced in them by large doses of tartarized antimony, particularly when too often exhibited or too long persisted in. In this complication, *sinapisms* and *blisters*, prescribed as above (§ 16), are beneficial after vascular depletion has been pushed sufficiently far; but, in many cases, much greater benefit will accrue from the application of the *warm turpentine epithem* on the chest or between the shoulders, or from one of the *liniments* (F. 297, 300, 311) already noticed, employed in the form of an embrocation. Having removed the existing complication, the subsequent treatment must entirely depend upon the peculiarities of the case. The *diet* and *regimen* should be strictly enforced, and the patient kept in a mild and equable temperature. The semicupium, or warm bath, gentle *diaphoretics* with *diuretics* and anodynes, and, as the disease declines, mild *tonics*, with *sedatives* and *antispasmodics*, will also be of great service. The excretions should be kept free, and change of air advised as soon as it can be safely attempted.

46. *C. The complication with cerebral affection* must be promptly met by the application of *leeches* behind the ears or to the occiput, or by *cupping* in this situation or on the nape, according to the age of the patient and the severity of the complication. Whenever the simple form of pertussis has presented such severity as to render the occurrence of pulmonic or cerebral affection at all probable, and more especially if the child have been plethoric, I have always directed *leeches* to be applied behind the ears or to the occiput, influenced by the views as to the pathology of the complaint already stated; and I have had the greatest reason to strongly recommend this practice. When hooping-cough is aggravated by *teething*, the cerebral complication should be dreaded, although neither *convulsions* nor any other very prominent symptom of it may have appeared. In these cases the gums ought to be attentively examined, and scarified as they may require it. If the infant be at the breast, the nurse's milk and health should receive attention. The secretions and excretions of the patient must be most actively promoted by full doses of JAMES'S *powder*, by *purgatives*, and cathartic enemata.

The temperature of the head should be reduced by the *cold affusion* on it, or by cold sponging whenever either becomes necessary, and the means advised for *Inflammations of the* Brain (§ 191), and for *Acute Hydrocephalus* (see Dropsy *of the Head*, § 260), ought to be employed, according to the circumstances insisted upon at these places. The objects are to remove incipient mischief, and to prevent thereby the accession of a formidable malady by a prompt application of efficient means. To wait until the coming evil has fully declared itself is to sacrifice the principal chances of success; for all cerebral affections that supervene during pertussis are much more dangerous than those which occur primarily. As soon as the complicated affection is removed, change of air should be recommended. Nothing is so advantageous as a complete change of air for children treated in London, or in other large towns.

47. *D. Infantile remittent fever* generally does not appear in connexion with pertussis until an advanced stage of the latter. Other associated affections, as *chronic pulmonary disease, curvatures of the spine, rickets, affections of the joints, enlargement of the mesenteric or of the absorbent glands*, &c., are sometimes also met with in protracted cases of hooping-cough, or in the stage of decline, particularly when the disease has been neglected, or when the morbid affection has been perpetuated by habit, or by the neglect of such means as are calculated to break the chain of disordered action. They often also may be traced to constitutional vice or predisposition, and to neglect of the excreting functions. Under whatever circumstance, either these or the remittent fever may occur in the advanced course of hooping-cough, debility is a principal element of the complicated malady. The functions of digestion and respiration, and, consequently, assimilation and nutrition, having been more or less impaired during the early stage of the primary disease, inherent vice, or an existing disposition to disorder, the more readily manifests itself. As constitutional power sinks, maladies, which most commonly arise from debility, make their appearance, the particular malady being determined in its occurrence by hereditary taint or by previous disorder. In many cases the superinduced affection is merely a sequela of pertussis; but, in others, the characteristic symptoms of the primary disorder still continue in a very pertinacious manner.

48. The remittent febrile disorder depends, in several instances, upon chronic irritation of the digestive mucous surface; in others, upon the state of the season or weather, and the influence of exhalations from a humid soil, or upon a moist and cold atmosphere: and in some, upon both conjoined. But whatever may be the source, it cannot be doubted that debility is an important part of the disorder, and that the alvine secretions and excretions are much disordered. At the same time, therefore, that a treatment appropriate to the affection of the digestive canal is requisite, the state of constitutional power must receive attention. *Purgatives* are generally necessary in this complication, especially at an early period of it; but they ought to be of a stomachic kind, or combined with *tonics*, and neither be too irritating, nor too pertinaciously directed. The compound infusions of gentian and of senna, with sulphate of potash; rhubarb with this latter, in an aromatic water; hydrargyrum cum creta, or blue bill, with ipecacuanha at bedtime; either of the preceding, or castor oil, being taken in the morning, are among the most suitable purgatives, and they should be repeated according to the state of the stools. If the bowels be irritable or dysenteric, a full dose of calomel or hydrarg. cum creta, with the compound ipecacuanha powder, should be first given, having in some cases premised an ipecacuanha emetic. Some hours afterward a dose of castor oil ought to be taken, and its operation promoted by an emollient injection. After the intestinal canal is evacuated, irritation should be allayed by mild tonics, conjoined with aromatics, absorbents, sedatives, or antispasmodics, according to the peculiarities of the case. Preparations of cinchona, quinine, chalybeates, &c., will subsequently be of service. The decoction of bark, or any tonic infusion, will be advantageously given with liquor potassæ, or Brandish's alkaline solution; and afterward the ammonio-chloride or potassio-tartrate of iron, and change of air will generally prove most beneficial.

49. Although this treatment is recommended chiefly with the view of preventing hooping-cough from lapsing into, or becoming associated with infantile remittent, and of removing this complication, yet it will be equally serviceable in the prevention of the other *sequelæ* of the complaint mentioned above (§ 47). When *affections of the joints, rickets*, or *mesenteric disorder* either supervene upon, or follow an advanced stage of pertussis, the preparations of *iodine*, and other means directed for these complaints, should be resorted to. *Affections of the spine* are generally owing to weakness of the muscles and ligaments of the vertebral column, induced by this disease, or to scrofulous inflammation of some portion of the column itself. When the disorder is attributable chiefly to the former of these causes, then the *tonics* already recommended, *salt water bathing, sea air*, and *frictions* with stimulating liniments along the spine will be very serviceable; and when the more solid structure of the column is implicated, then the preparations of iodine, Brandish's alkaline solution, or the *liquor potassæ*, and change of air, should be severally prescribed, as circumstances will suggest.

50. iii. *Of the more Specific Modes of Treatment advised for Hooping-cough, and the Circumstances in which they are admissible or appropriate.*—Willis and Sydenham directed *blood-letting* in the plethoric and inflammatory cases, *emetics* of the oxymel of squills, *purgatives*, and *blisters* to the nape of the neck or between the shoulders. Willis also prescribed *tonics* during the decline of the complaint. He particularly notices the *Muscus pyxidatus*, or *M. Pyxioides*, the *Lichen pyxidatus* of Tournefort, or cup-moss, as a very popular remedy in hooping-cough. Gerarde remarks that "the powder of this mosse, given for certaine daies together, is a most certaine remedy for that perillous malady the chin-cough." Dillenius praised the powder of it when frequently given, and supported his opinion by the authority of

Willis and Gerarde. Other writers have prescribed it in the form of decoction in milk. Van Woensel (*Hist. de la Soc. Roy. de la Méd.*, t. ii., p. 294) recommended it in decoction, sweetened with sirup of mint. Baglivi employed, also, the *Muscus arboreus* and *M. querneus* in pertussis, in the form of decoction; and a sirup prepared from the decoction exists in the *Pharmacopœia Wittembergensis*, to facilitate its exhibition to children. Stoll (*Rat. Med.*, vol. vi., p. 6) found these mosses or lichens, particularly that growing on the oak, very serviceable in the hooping-cough which was epidemic in Vienna in the spring of 1775. Frank also praises it.

51. De Haen, in a letter written in 1747 to Van Swieten, describes a very prevalent and fatal epidemic hooping-cough. Children from a few weeks to ten years of age were chiefly affected, but adults were occasionally also seized. When one child was attacked in a family, none escaped who had not had the disease previously. It was often protracted to three, four, or even six months. He states that vascular depletion in the plethoric, purgatives, ipecacuanha, anodyne emulsions, opiates, oxymel of squills, nitre, &c., were severally employed, but with no marked success. He subsequently, with his colleagues, Ouwens, Westerhoff, and Velsen, was induced to prescribe the *Kermes mineral*, by the benefit derived from it in spasmodic asthma. To a child of six months, he commenced with one grain in the 24 hours, given in sugar and divided into three powders; to a child of one year, two grains in the same period; and to a child of three years, three grains, increasing the dose gradually and cautiously. The success of this medicine he describes as most astonishing. In another letter similarly addressed, in 1751, De Haen remarks, that although he had found the *Kermes mineral* of very great service in the hooping-cough of that autumn, it was less so than in the epidemic of 1747: and he adds, "Plerique vero curantur *Limacum** lacte coctarum largo atque protracto usu." (A. De Haen, *Opusc. quæd. inedita*, &c. *Cur.* J. Eyerel, P. i. Vind., 1705, p. 42, 173.) In another work (*Rat. Med.*, t. iv., p. 121) he notices a case in which the fit of cough terminated in suffocation; but the means usually resorted to in suspended animation having been employed, restoration and recovery took place.

52. Stoll states that he never saw sporadic cases of pertussis in Vienna up to the year 1777. The disease had previously appeared only in epidemic forms, and generally with modified characters. At some seasons the stomach, at others the head, and sometimes the lungs, were especially deranged. Occasionally it was attended by a miliary, and in some instances by a scarlet eruption. In a few cases urticaria and erysipelas occurred. In Vienna and Hungary it generally evinced a stomachic origin. The epidemic of 1775 frequently affected adults. The paroxysms were most severe on the alternate days, and during the night; and peripneumonia was a frequent complication. He states that blood-letting, emetics, purgatives, emollients, and opiates, especially these last, were prescribed without benefit. Blistering, however, between the shoulders, and bleeding, were beneficial when the disease was about to pass into pneumonia. He observed the injurious effects of stimulating expectorants in favouring the development of pneumonia, with which pertussis is so apt to become complicated. Tonics were generally required as early as debility became apparent; and, even after the disease was removed, they were often necessary. When the bowels were not freely open, they were conjoined with aperients. In the epidemic of 1779, all the cases in which the fits terminated in vomiting recovered. Stoll found ammonia, gum ammoniacum, and Venetian soap, given in simple oxymel, or oxymel of squills, of service. Decoctions of emollient herbs and roots, and of the flowers of arnica, were also beneficial. Opiates were productive of mischief in many cases, and even of fatal effects in some, a glutinous effusion having been found in the bronchi of such cases. During the epidemic in Copenhagen in 1784, Bang made trial of the *cicuta*, after the exhibition of *emetics*; but with temporary advantage only. Towards the decline of the disease, *musk* was found of service.

53. Dr. Huxham introduced the use of *mercurial purges*. After their operation he prescribed the *Peruvian bark*. Dr. Bisset commenced the treatment with an *emetic* of oxymel of squills, followed by rhubarb, manna, &c. As soon as the severity of the complaint began to subside, and the intervals between the fits to be prolonged, he gave the bark. The propriety of having recourse to *emetics* was advocated by Hoffmann, Forbes, Aaskow, Navier, Amstein, Hufeland, and others. The substances usually employed as emetics were ipecacuanha, tartar emetic, Kermes mineral, and oxymel of squills. They were generally exhibited at the commencement of the treatment, and occasionally in the course of the complaint. Lafosse and Remer gave them only at the commencement. Ipecacuanha was preferred by Linnæus, Aaskow, Thilenius, Weber, and many others; and oxymel of squills by Malzer. Stoll considered emetics to be especially serviceable in hooping-cough during summer or autumn. Struve directed them in the evening, and Sims after blood-letting. Lettsom believed them to be useless, and Jones and Niemann to be absolutely injurious. Burton was among the first to condemn them, and he no less objected to blood-letting and cathartics, unless in inflammatory cases. In their stead he prescribed a mixture, the most active ingredient of which was tincture of cantharides. There can be little doubt of emetics having been occasionally abused by inappropriate exhibition; but experience has proved them to be most serviceable in this complaint, when judiciously employed. At the present day, the means advised by Borsieri are the most generally applicable, and therefore the best, as far as it goes, that can be adopted. He prescribed a smaller or larger emission of blood early in the disease; a gentle emetic, occasionally repeated, where there is no symptom forbidding it; aperients of calomel, rhubarb, or manna, and external irritants.

* Appended to a case treated by Stoll, the history of which is given by Eyerel (*Op. cit.*, t. ii., p. 184), is the following note: Decoctum *limacum*, in epidemica tussi convulsiva egregium et unicum sæpe fuit remedium, teste Haknio, qui a femina rustica Hungæ Batavorum id didicit. Adfuere aliæ epidemiæ ubi nil juvit, sed ubi Kermes mineralis et opium omnem absolvit pugnam—Decoctum hoc limacum per octo dies repetatur.

The only fault that can be found with this treatment is the neglect of demulcents, anodynes, and antispasmodics, which are very generally beneficial in an advanced stage of the complaint.

54. Dr. Darwin insisted upon the frequent occurrence of peripneumonia during hooping-cough; and he therefore directed *leeches*, to prevent as well as to remove this complication. After evacuating the bowels and giving diluents, and when the complaint had reached the second stage, he prescribed, for a child of about three years, a sixth of a grain of calomel, a sixth of a grain of opium, and two grains of rhubarb, twice a day. The only objection to this treatment is the too general use of opium, and the amount of the dose of it, for a child: in combination, however, with calomel, it is much less injurious than when given alone. He likewise employed antimonial emetics, mild cathartics, cool air, repeated blisters, or the tincture of cantharides internally, warm bathing, the inhalation of the steam of warm water containing a little vinegar, opiates in small doses, and digitalis. He prescribed digitalis whenever a tendency to inflammation, or to effusion, or to pulmonary consumption, appeared. He considered, with much justice, *diuretics* to be more or less useful in this, as in other disorders implicating the respiratory organs. Dr. Elliotson has very properly contended, that, wherever there is oppression of breathing, with violent spasmodic attacks of cough, accelerated pulse, and sonorous or crepitous rattle, inflammation of the respiratory organs is present, and should be treated by bleeding, by emetics, and by calomel. In such cases, sedatives and antispasmodics ought not to be resorted to until inflammatory action is removed, and the secretions and excretions are freely evacuated. It is unnecessary to allude farther to the various modifications of treatment adopted by other experienced physicians. I shall, therefore, only notice some of the principal remedies prescribed for this complaint.

55. iv. *a. Blood-letting* was directed early in hooping-cough by the great majority of writers, since the time of Sydenham to the present day; and frequently even in slight and simple cases, as a precautionary measure, particularly in plethoric habits. Lettsom has justly remarked that, if it be not resorted to early in the complaint, it is seldom of service at an advanced period; but cases in which inflammatory affections of the lungs or brain arise at this period furnish exceptions to this rule. Stoll prescribed depletion chiefly when the lungs became affected. Hufeland directed *leeches* to the chest; and Webster to the temples, in most cases. I have seldom omitted to apply them behind the ears, or between the nape and occiput, or to prescribe *cupping* in this situation, at an early stage, influenced by the reasons stated above (§ 35). Of *emetics* mention has already been made (41, 44). *Purgatives* have been employed chiefly with the view of evacuating accumulations of fæces, and of promoting the secretions and excretions. *Calomel* has been very generally recommended, both as an aperient and as an alterative. Fischer and Hargens gave it alone; but it has been more generally conjoined with rhubarb or some other purgative; and, in the inflammatory complications, with James's powder, ipecacuanha, &c. Darwin and Stroem prescribed it with rhubarb and opium; in which combination it is often beneficial at an advanced stage, and in patients above four or five years of age. The frequent use of *laxatives* or mild purgatives has been much insisted upon by Michaelis and Kortum. *Cathartic* or *irritating enemata* have been resorted to by Holdefreund and Hufeland.

56. *b. Diaphoretics and expectorants* have been generally employed through the course of the complaint; the former at the earlier, the latter at more advanced periods. Some of these medicines promote both perspiration and expectoration, and are hence the more serviceable in severe or complicated states of the complaint. *Antimonials*, in small doses, were praised by Fothergill, Weber, and many others. The solution of tartar emetic was employed by Hirschel; the golden sulphuret of antimony was preferred by Closius and Hannes. Van de Sande and Unzer gave it after having premised emetics, and Holdefreund conjoined it with sugar of milk. The *Kermes mineral* was prescribed by De Haen, Hargens, Kortum, Hinze, and Styx. Quarin gave it with the flour of sulphur, gum Arabic, and extract of liquorice; but, although formerly in great repute in febrile and pulmonary diseases, it is now seldom employed. The following powder was once much used on the Continent for the cure of this complaint:

No. 257. ℞ Kermes Mineralis, Pulv. Ipecacuanhæ, āā gr. j.; Ocul. Cancror. pulv. et Pulv. Acaciæ, āā ʒj. Tere bene, et divide in Cartulas vj., quarum capiat unam sextis horis.

57. This dose was prescribed for a child of one or two years. Much of the virtues of these powders was clearly attributable to the *ipecacuanha*, which is one of the most serviceable medicines employed for hooping-cough. Hennings and Keutsch relied chiefly upon it, and gave it in minute and frequent doses. Hargens ordered it in considerable quantities; Krebs, in the form of infusion; Vogler, with opium, magnesia, gum Arabic, and sugar; and Pearson, with opium and soda. *Ammoniacum* and *squills* have been used as expectorants; but they require much caution, for, in the more inflammatory states of the complaint, they may aggravate the disorder, or even favour the occurrence of inflammatory action in plethoric habits, or when the phlogistic diathesis is present. The *oxymel of squills* was frequently employed as an emetic, and often with benefit. Hufeland and Sulzer gave it with cinchona and extract of hyoscyamus, in the advanced stages of the complaint.

58. *c.* Numerous *antispasmodics* have been prescribed in the *second* and *third stages*, on account of the convulsive character of the affection. *Asafœtida* was recommended by Millar; but was considered useless by Hufeland. *Castor* was given by Morris and Horn; *musk*, by Conradi, Gesner, Wolff, Von Berger, Hufeland, and Horn. Marcus conjoined musk with the sulphuret of antimony and magnesia. The *oxide of zinc* was praised by Crell, Percival, and Hart. Scheidemantel very judiciously employed it after evacuations. Winckler and Tode gave it with cinchona, and Starke with cream of tartar; but from this combination tartrate of zinc must have been formed. Har-

gens, however, considered it inefficacious. I have but little experience of its effects in this complaint. *Camphor*, in very small doses, with diaphoretics, at an early period; and in larger quantities, with anodynes, other antispasmodics, or tonics, is often of great service, particularly after moderate depletion and alvine evacuations. The *subcarbonates of the alkalies* were given by Hinze, Memminger, Pearson, and Keutsch, and are often important adjuvants, in conjunction with hyoscyamus or other narcotics, and with rhubarb or other aperients, in the treatment of the second and third stages. I have, however, often preferred the *liquor potassæ*, or Brandish's alkaline solution, especially in the scrofulous diathesis, and in cachectic habits. The subcarbonate of *ammonia*, in small doses, and other preparations of ammonia, are frequently beneficial in cases of debility at an advanced period, or when the complaint is protracted. *Muriate of ammonia* was recommended by Stoll at an early stage, with oxymel. I have found it an excellent refrigerant antispasmodic and tonic in several instances.

59. *d.* The most energetic *narcotics* and *anodynes* have been prescribed, with a view of allaying spasmodic action, and generally in conjunction with some one of the antispasmodics or diaphoretics already noticed. *Opiates* were given by De Haen, with camphor and musk; by Hufeland, in the form of Dover's powder; by Jocob, with pectoral elixirs and spirits of nitric æther; by Ruling, similarly combined, after four or five emetics; and by Lefosse and Lettsom, in the second and third stages, with cinchona. Willan employed a watery extract of opium; and Brera used it externally, in frictions or in liniments. Of the various preparations and combinations of opium, the paregoric elixir is indisputably the best in hooping-cough, especially when given with an alkaline subcarbonate, in almond or mucilaginous emulsions. The extract of the *lactuca virosa* was praised for this complaint by Dr. Gumprecht and others, and it has been much employed by some practitioners. *Conium* was first prescribed for hooping-cough by Dr. Stoerck and Dr. Butter. It was afterward used by Ranoe, Schneider, and Hufeland. Lettsom and Hargens considered it devoid of efficacy. I have prescribed it in numerous cases, and believe it beneficial when its virtues are not injured by preparation or age. It should not be given in the first stage. *Hyoscyamus* was recommended by Wolff, Wigand, and Joerdens; and by Fischer, with vegetable bitters. It is nearly as beneficial as conium; but in some patients it is more liable to affect the head.

60. *Belladonna* has been extensively tried by Continental physicians in pertussis, and the powder of its root was most commonly employed, particularly by Ranoe, Buchhaave, Frank, Meglin, and Etmuller; and by Laennec after the operation of emetics. Schaeffer and Widemann gave it in large doses, and considered that it was quite a specific, particularly when administered in enemata. This is, however, a somewhat dangerous mode of prescribing it. The minute doses recommended by Wezler and Hufeland are much more judicious. The extract of *tobacco* has likewise been prescribed by Gesner, Thilenius, and Hufeland; but it also requires much caution, and ought not to be tried with young children. The tincture of *Lobelia inflata* has been employed by Dr. Andrews with benefit. When the convulsive cough is aggravated by the accumulation of viscid mucus in the bronchi, the exhibition of this medicine, until it produces vomiting, will be of great service. *Colchicum* was praised by Haden and Alcock; and, when cautiously given in conjunction with magnesia, or the alkaline carbonates, or with either of the antispasmodics noticed above (§ 58), it is of service in the inflammatory complications; but it may be very injurious in other circumstances, and particularly in very young patients. The same remarks apply to *digitalis*, as prescribed by Drake and Darwin. *Hydrocyanic acid* has also been recommended by Dr. Granville and Dr. Elliotson. I have seen much benefit derived from it in the advanced stages of the complaint, particularly when given in conjunction with camphor, or with gentle tonics or demulcents. It should be most cautiously tried, if tried at all, with young children. Dr. Elliotson, however, remarks that a minim may be added to an ounce or two of almond emulsion, and a teaspoonful of this given them three or four times a day. *Laurel water* was much employed in hooping-cough by Continental physicians, and is still preferred by many to prussic acid.

61. *e.* Among *stimulants*, the tincture of *cantharides* has been most frequently employed. It was praised by Forbes, Schaeffer, and Ploucquet; and was prescribed with camphor and extract of bark by Burton; with antispasmodics and anodynes by Wolff, Widemann, and Hufeland; with preparations of cinchona by Chalmers; and with these and paregoric by Lettsom and Graves. I have prescribed it in a number of cases, and have found it diminish the frequency and severity of the fits in the nervous states of the complaint, particularly when it occasioned irritation of the urinary organs. The extract of *nux vomica* was recommended by Michaëlis and Hufeland, conjoined with the extract of *Carduus benedictus*. I have tried it, with manifest advantage, in circumstances similar to those in which cantharides was employed. But neither the one nor the other ought to be resorted to in the first stage, or in the inflammatory complications. *Guaiacum* has been prescribed for pertussis, chiefly by Hufeland and Veizhans; and *saffron* with castor, after due evacuations, by Theussink and Hargens. *Castor* was itself much employed by Sauvages, Morris, and Horn; and a decoction of unroasted *coffee* was given by Hufeland. The *muriate of barytes* has also been noticed with commendation by the writers just named.

62. *f.* The propriety of having recourse to *tonics* in the second and third stages, particularly the latter, cannot be disputed; but they ought not to be prematurely prescribed, especially in the second stage, and while a phlogistic diathesis is present even in the slightest degree. Of the various tonics, the preparations of *cinchona* are certainly the best. The infusion may be first given, conjoined with the solution of the acetate of ammonia, and subsequently the decoction with liquor potassæ or the subcarbonate of soda. The extract of conium or hyoscyamus, or paregoric elixir, may be added to either of these. *Bark* was strong-

ly recommended by Quarin, Courbette, and Holdefreund. Hannes gave it with the sulphuret of antimony, and administered it in enemata; and Sauvages and Morris, with castor; Bisset, Stoll, Aaskow, Weber, and Michaelis very judiciously premised sanguineous depletions, emetics, and purgatives before they ventured upon it. Murray and Hufeland gave it with cantharides in the latter stages. It is much more beneficial in some epidemics than in others. When the complaint is protracted, and assumes an intermittent or periodic type, particularly a tertian form, quinine or cinchona ought never to be omitted. The *arsenical solution* has also been employed in circumstances requiring the bark. It was much recommended by Ferriar and Simmons, and is undoubtedly of service in these; but it is not superior to cinchona; and, in children especially, it is a much more hazardous substance. I have given the *sulphate of zinc* with great benefit in some cases; and the *nitrate of silver*, triturated with *extract of hop* or of hyoscyamus, with equal advantage, in others. The *sulphate of iron* was very favourably noticed by Dr. Stanger, and is an excellent medicine in the third stage, or purely nervous state of the complaint; but it is not superior to the other preparations of iron, particularly the *ammonio-chloride* and the *potassio-tartrate*.

63. *g*. There are various other medicines which have been employed internally against hooping-cough; but these require only a simple enumeration. Of the *Lichen pyxidatus* mention has already been made (§ 50). The *Lichen cocciferus* was recommended by Forbes and Von Woenzel; and the *L. Islandicus* by Weber. The *Ledum palustre*, *Tilea Europæa*, and *Althæa officinalis* were prescribed by Wahlbom, Linnæus, Walter, and Wahlin; the *Geum urbanum*, by Keck and Buchhaave; *Phellandrium aquaticum*, by Van der Bosch; an infusion or extract of the *Narcissus pseudonarcissus*, by Dufresnoy; an extract of the *Mesembryanthemum*, by Wendt; and an extract of the *Cardamine pratensis*, by Comhaire and Veillecheze. *Isinglass* was used in this complaint by Heineken and Gautieri; *acetate of lead*, in small doses, by Forbes; *oxyde of zinc*, with cicuta or belladonna, by Guersent; diluted *acetic acid*, with sugar, by Hannes; *sulphur*, by Sydenham, Quarin, and Unzer; and the *sulphuret of potass* by several Continental physicians.

64. *h*. There are few complaints in which *external medication* has been so extensively or so beneficially employed as in this. Although the *inhalation* of simple or medicated watery vapours does not strictly come under this head, I may here state that it has been advised by Pearson, Darwin, and others. The observations as to this practice, in the article on *Inflammations of the* Bronchi (see that article), and as to the medicines that may be used in this manner, entirely apply to hooping-cough. In the early stage, the vapour to be inhaled should be either simple or merely emollient. In the latter stages it may be slightly impregnated with camphor, or with some narcotic; but this practice can seldom be adopted for young children. The inhalation, in early or inflammatory states of the complaint, of stimulating vapours is always injurious.

65. *i*. *External irritants* of various kinds have been prescribed. *Blisters* were applied to the chest, and between the shoulders, by De Meza, Paldamus, Quarin, and others; but the precautions stated above (§ 44) should be observed, particularly in cases of infants and young children. Knebel directed *rubefacients* to the nape of the neck; Pelargus and Hufeland, to the lower extremities; Henning and Hecker, to the epigastrium; and Durr, to the soles of the feet. Various substances have been employed as external irritants. Henning recommended a cataplasm containing scraped *horseradish*; Struve, a liniment with tincture of *cantharides* and *tartar emetic*; and Zadig, the tincture of *ginger* applied to the epigastrium. Autenrieth prescribed an ointment containing tartar emetic to be rubbed upon the chest, or between the shoulders, or upon the epigastrium; and this practice was adopted by Kelch, Merrem, Nolde, and Michaelis; but Horn and Schneider found it productive of little or no benefit. Autenrieth has received the credit of being the first to employ tartar emetic as an external irritant; but it was thus recommended long previously by the older Monro. I have seen the incautious use of this ointment productive of dangerous, and even of fatal sloughing, in debilitated or cachectic children and infants. Loebenstein-Loebel advised a liniment containing a solution of *phosphorus*, in oil of cummin and camphor, to be applied on the epigastric region. From an extensive experience of external irritants in the treatment of pertussis, I prefer the *semicupium* or *pediluvium*, mustard and salt having been put into the water; the occasional application of a *mustard poultice* to the chest or epigastrium; *dry cupping* on the nape of the neck or between the shoulders; or *friction* with the following *liniment* along the spine, or the application of a piece of flannel moistened with it on the sternum or epigastric region, according to the peculiarities and complications of the case:

No. 258. ℞ Linimenti Camphoræ Comp., Linimenti Terebinthinæ, ää ʒj.; Tinct. Capsici ʒj.; Olei Caojuputi ʒss. vel. ʒj. Misce. Fiat Linimentum, vel Embrocatio.

66. Since the introduction of *vaccination*, it has been proposed by Okes, Cleeve, and Moutain to inoculate with the vaccine matter as a preventive and as a cure of hooping-cough. This subject has been recently agitated, but without any conclusive evidence of benefit having been derived from the practice.*

67. *k*. In the second, but especially in the third stage of the disease, *change of air*, particularly to the seaside, as recommended by Gregory and Hufeland, and *sea voyaging*, are of the utmost advantage. For patients residing on the seacoast, *frequent excursions* on the water will be highly beneficial, especially if nausea or vomiting be thereby produced. *Salt-water bathing*, commencing with the warm or tepid bath, and passing gradually to the cold bath or shower bath, will be found very serviceable, if no complication forbid it. The *diet*

* [It is well ascertained, by recent and repeated experiments, that vaccination exerts no control over the progress of pertussis. Ten children labouring under this disease, who had never been vaccinated, were admitted into the hospital for children, in Paris, in 1835, of which nine were vaccinated. Pustules were regularly developed, but the hooping-cough was in no respect modified by the vaccine disease.—(*Bull. Gen. de Therap.*, July 30, 1836.)]

of the patient, in the first stage, should be antiphlogistic; and in the second and third it ought to be very light, chiefly farinaceous, and moderate in quantity. Over-distention of the stomach aggravates the fits and favours cerebral congestions. Exposure to cold, or to vicissitudes of weather or temperature, running, &c., also, may induce inflammatory complications. Young children ought to be carefully watched at night, and be raised up as soon as the fit is threatened. Whenever the phlegm obstructs the fauces, it should be removed by a small, thin piece of whalebone, bent in the form of a tongue-scraper, or by the finger of the nurse.

[The treatment of hooping-cough in our country is generally very simple; for, unless complicated with other affections, it usually runs its course with safety, seldom requiring the interference of art, much less the employment of active measures. The opinion very generally prevails that the disease cannot be arrested, and that all we should aim to accomplish is to palliate the symptoms and assist nature in the means which she has pointed out for its relief, as by the administration of emetics, which tend to promote the bronchial secretion as well as favour its removal. In this as in all other complaints, our treatment is, of course, to be regulated by the stage of the disease, the violence of the attack, its simple or complicated character, and the age and vigour of the patient, and the judicious directions laid down by our author will prove an ample guide to the practitioner under the different circumstances in which he may be called to prescribe.

From considerable experience, we are induced to believe that this disease may be greatly modified, if not arrested in its course, by a somewhat active treatment in its commencement, especially when it attacks with any considerable degree of violence; and, accordingly, we have for some time past been in the habit of treating it, in its first stage, as a simple bronchitis, with general or local bleeding, purging, emetics, and the usual antiphlogistic measures. In many instances the disease will be of too mild a character to require anything more than gentle emetics and expectorants with an occasional cathartic; but we have so often seen its violence and duration so obviously abated by blood-letting, and especially by cups to the chest, that we cannot hesitate to resort to these means, rejecting as we do the hypothesis that the affection is a simple neurosis, and has a certain prescribed period to run. We rarely, if ever, prescribe antimony to children under two years of age, on account of the violence with which it frequently operates; after that period it may be cautiously administered with great benefit in this disease, as it is supposed to meet the double indication of bronchial inflammation and spasm consequent on neurosis, over both of which it exerts a manifest influence. The *ipecacuanha*, in combination with sulphur, we have found well adapted to these cases, and where the cough is urgent, a small quantity of hyoscyamus may be combined with it. If the catarrhal symptoms are severe, calomel purges will prove highly beneficial, to be followed by an emetic of ipecacuanha, or the same medicine in expectorant doses. Alkalies are useful in every stage of the affection.

Of the class of antispasmodics the belladonna, and asafœtida are in most repute in the treatment of this disease among American practitioners, although the hydrocyanic acid has some warm eulogists. The hyoscyamus is also an admirable remedy in the latter stages of the affection, and a very good form of administering this, as well as the belladonna, is to combine it with the sirup or wine of ipecacuanha and subcarbonate of potassa. We need not add that these narcotics should be given to children with great caution; we, however, place more reliance on change of air and travelling in the chronic stage of hooping-cough, when severe, than on all other remedies.]

Bibliog. and Refer.—*Amatus Lusitanus*, Cent. vi., 90. — *Willis*, Pathol. Cerebr., cap. 12; et De Medicament. Operat., par. i., sect. i., cap. vi., p. 169.—*Sydenham*, Epist. i., Respons. Opera., Lugd. Bat., 8vo., 1726, p. 311. — *H. Sloane*, Voyage to Madeira and Jamaica, fol. Lond., 1707. —*F. Hoffmann*, De Tussi Convulsiva, Opp. Suppl. ii., De Tussi, iii. Halæ, 1732.—*Alberti*, De Tussi Infantum Epidemica. Halæ, 1728.—*Huxham*, Opp. i., p. 98. De Morbis Epid., vol. ii., p. 75.—*Brendel*, Progr. de Tussi Convulsiva. Goett., 1747; v., Opp. i., p. 159.—*L. C. Bourdelin*, *J. B. Basseville*, Ergo Tussi Clangosa Emesis. Par., 1752. — *Haller*, D. ad M., i. — *Nayler*, Dissertation sur plusieurs Maladies qui ont régné à Chalons sur Marne, &c. Paris, 1753. — *Theod. Forbes*, De Tussi Convulsiva. Edin., 8vo, 1754. — *Haller*, D. ad. M., ii. — *C. G. Geller*, Scrutinium Physico-medicum de Tussi Convulsiva. Rost., 8vo, 1763. —*John Williams*, Histories of Wounds of the Head, with Remarks on the Convulsive Cough. Falmouth, 8vo, 1765. — *De Haen*, Opuscul. Inedit., P. i., No. 25. — *Starke*, Errichtung des Klinischen Instituts, &c.—*Burton*, Edin. Med. Essays, vol. vii., p. 120. — *Bisset*, Medical Essays and Observ., p. 178.—*J. Fothergill*, Letter on the Cure of the Chincough. Lond., 8vo., 1767. (Med. Obs. and Inq., iii.)—*Van Woensel*, in Histoire de la Société de Médecine, t. ii., p. 294.—*Morris*, in Medical Observations and Inquiries, vol. iii., No. 27.—*John Millar*, Observations on the Asthma and Hooping-cough. Lond., 8vo, 1769.—*C. J. Mellen*, Von dem Keichhusten der Kinder, &c. Fr., 8vo, 1770.—*W. Butter*, Treatise on the Kinkcough. Lond., 8vo, 1773.—*T. Kirkland*, Animadversions on the late Treatise on Chin-cough. (Anon.) Lond., 8vo, 1774.—*Thilenius*, Medic. und Chirurg. Bemerkungen, p. 294.—*Douglas*, in Medical Observations and Inquiries, vol. vi.—*De Haen*, Rat. Med., cont. iii., p. 269.—*Panzani*, Beschreibung der Krankheiten von Istrien, &c., No. 5.—*Linnæus*, Dissert. Viola Ipecacuanha. Upsal, 1774.—*F. R. S. Holdefreund*, Vom Epidemischen Stikhusten der Kinder. Helmst., 8vo, 1776.—*U. B. Aaskow*, *J. J. De Berger*, De Tussi Convulsiva Hafn. Act. Soc. Med. Havn., 4to, 1777.—*Metzer*, Abhandl. vom Keichhusten, &c., 1791.—*C. Strack*, De Tussi Convulsiva Infantum. Tic., 8vo, 1777.—*Frank*, Syll. Opusc., iii.—*Scheidemantel*, Beytrage, No. 48.—*Percival*, in Med. Comment. Edin., vol. v., p. 175.—*Sims*, Observations, &c., p. 92.—*Stoll*, Prælect. in Morb. Chron., vol. i., p. 321; et Rat. Med., P. ii., p. 178, 180, and 185; P. iii., p. 152; P. v., p. 135.—*Buchhaave*, in Act. Soc. Reg. Med. Havn., vol. ii., p. 176.—*Ranoe*, in Act. Soc. Reg. Med. Hafn., vol. ii., p. 346.—*Strom*, in Ibid., vol. iv., p. 329.—*Von Berger*, in Ibid., vol. i., No. 27.—*De Meza*, in Ibid., vol. ii., p. 36 and 334.—*Home*, Princip. Medic., l. 2, p. 3, sect. 5, 10.—*Quarin*, Animadvers., p. 36.—*Nurnberger*, Dissertatio de Pertussi. Witeb., 1783. *Doering*, i.—*Haberler*, Dissertatio de Tussi Convulsiva Epidemica. Marb., 8vo, 1784. *Doering*, i.—*Kachler* Epistola de Tussi Convulsiva et Variolis. Erl., 1784. *Doering*, i.—*A. F. Metternich*, De Tussi Convulsiva Infantum. Ticin., 8vo, 1785.—*Frank*, Del. Op., iii.—*A. Murray*, De Cortice Peruviano in Tussi Convul. Gott., 8vo, 1785 Opusc., 2 vol.—*C. Strack*, De Tussi Convul. Infantum. Ticin., 8vo, 1785.—*Frank*, Del. Op., iii.—*T. Hayes*, A Serious Address on Coughs, with Observations on Hooping-cough. (3d Edit.) Lond., 8vo, 1786.—*J. Hasler*, Abhandlung ueber den Keichhusten. Landsh., 8vo, 1789.—*Pohl*, Programma de Analogia inter Morbillis et Tussem Convulsivam. Lips., 1789.—*Du Fresnoy*, Des Propriétés du Narcisse des Prés, &c., Rhus radicans. Paris, 1788.—*Marx*, Bestatigte Kräfte der Eicheln., p. 4.—*Kluger*, Etwas über den Keichhusten. Goett., 1790.—*Hartmann*, Specilegia ad Tussis Convulsivæ Historiam, et medendi Methodum pertinentia. Francof., 1790. *Doering*, i., p. 155.—*Hartmann*, De Tussi Convulsiva. Francof., 1790. *Doering*, i.—*Lettsom*, in Edin. Med. Commen., vol. iii., p. 286.—*Unzer*, in Hamburg Magazin, b. viii., p. 370.—*Ferriar*, Medical Histories, vol. iii., No. 5.—*F. G Dans*, Versuch einer Allgemeinen Geschichte des Keichhustens. Marb., 8vo, 1791.—*F. C. Metzer*, Abhandlung von dem Keichhusten. Petersb., 8vo, 1791.—*W. Simmons*, in Annals of Med., vol. ii., p. 393.—*Schäffer*, in Salzb. Med. Chir. Zeitung, 1793, b. iv.,

p. 241.—*Rüling*, Beobachtung der Stat. Northeim, p. 107.—*J. H. W. Klinge*, Etwas ueber den Keichhusten. Goett., 8vo, 1792.—*G. Jones*, Observations on the Nature and Treatment of Hooping-cough. Lond., 8vo, 1794.—*Boehmer*, De Tussi Convulsiva. Viteb., 1795.—*Francke*, De Tussi Convulsiva per totum fere Annum 1796.—*J. M. B. Burton*, A Treatise on the Non-Naturals, with an Essay on Chin-cough. York, 8vo, 1798.—*Kreysig*, De Tussi Convulsiva et Asthmate Acuto Infantum. Millari Viteb., 1798.—*C. W. Hufeland*, Bemerkungen ueber Blättern, verschiedene Kinderkrankheiten, &c. Berl., 8vo, 1798.—*R. R. Von Rosenstein*, Anweisung zur Erkenntniss, &c., der Kinderkrankheiten. Goett., 8vo, 1798.—*Belreis*, De Tussi Convellente Epidemica et Contagiosa. Helmst., 1801.—*F. G. Dans*, Abhandlung vom Keichhusten der Kinder. (2d edit.) Marb., 8vo, 1802.—*Michaëlis*, in *Hufeland's* Journal der Pr. Arzneyk., b. vi., p. 212.—*Styx*, in Ibid., b. vii., 4 st., p. 177.—*Schaeffer*, in Ibid., b. vi., p. 260.—*Hargens*, in Ibid., b. vii., 2 st., p. 91 and 92.—*Struve*, in Ibid., b. ii., p. 447; et b. iv., p. 602.—*Hinze*, in Ibid., b. v., p. 907.—*Kortum*, in Ibid., b. iv., p. 398.—*Conradi*, in Ibid., b. iii., p. 764.—*Sulzer*, in Ibid., b. iii., p. 768.—*Winckler*, in Ibid., b. ii., p. 453.—*V. H. L. Paldamus*, Der Stickhusten nach Neuern Ansichten Bearbeitet. Halle, 8vo, 1805.—*F. Jahn*, Ueber den Keichhusten. Rudolst, 8vo, 1808.—*V. Lando*, Memoira sopra la Tosse Convulsiva in Genova nell' Anno 1806. Gen., 8vo, 1809.—*Darwin*, Zoonomia, vol. ii.; and vol. iii., p. 55, 313, and 376.—*Fischer*, Anleitung zur Armenpräxis, p. 393.—*Joerdens*, in *Hufeland*, Journal der Pract. Heilkunde, b. xx., 2 st., p. 14.—*Widemann*, in Ibid., b. xxii., 1 st., p. 162.—*Vogler*, in Ibid., b. xx., 1 st., p. 98.—*Knebel*, in Ibid., b. xxvi., 2 st., p. 119.—*Stern*, in Ibid., b. ix., 3 st., p. 145.—*Hufeland*, Journal der Pr. Heilk., 1811, Jun., p. 25.—*Nolde*, in Ibid., Oct., 1811, p. 81.—*Schaeffer*, in *Hufeland* und *Himly*, Journal der Pract. Heilk., 1811, Aug., p. 13, and p. 15.—*Michaëlis*, in Ibid., Febr., 1812, p. 21.—*Schneider*, in Annalen der Heilkunst., 1811, Jun., p. 492.—*Marcus*, Magazin für Specielle Therapie, &c., b. ii., p. 339.—*Treuner*, in *Stark's* Archiv., b. vi., p. 537.—*Merrem*, Observ. in *Autenreithen*, Method. Tussis Convuls. Medendi. Marb., 1810.—*Schaeffer*, Volkskrankheiten, 1806, Sept., p. 32.—*Frank*, Acta Instit. Clin. Viln., iii., p. 16.—*Wexler*, in Salzb. Med. Chir. Zeit., 1810, iv., p. 347.—*Horn*, Archiv., 1810, Jul., p. 303.—*Velsen*, in *Horn*, Archiv., 1811, Nov., p. 442.—*Struve*, in Lond. Med. and Phys. Journ., vol. i., p. 84.—*Warner*, in Ibid., vol. vii., p. 305.—*Bellamy*, in Ibid., vol. viii., p. 41.—*T. V. Okes*, in Ibid., vol. viii., p. 426.—*Noehden*, in Ibid., vol. ix., p. 176.—*E. Jones*, in Ibid., vol. xvi., p. 16.—*A. C. Willey*, in Ibid., vol. xvii., p. 293.—*Okes*, in Ibid., 1802.—*J. Robertson*, in Ibid., vol. xviii., p. 566.—*S. Fothergill*, in Ibid., vol. xix., p. 91.—*J. Adams*, in Ibid., vol. xxiii., p. 177.—*Ferriar*, in Ibid., vol. xxv., p. 115.—*Blake*, in Ibid., vol. xxvii., p. 102.—*Edmondston*, in Edinb. Med. and Surg. Journ., vol. vii., p. 16.—*Ferriar*, in Ibid., vol. vii., p. 231.—*Pearson*, On Medical Facts and Observations, vol. vii., No. 10.—*Stanger*, in Medico-Chirurg. Transactions, vol. i., p. v.—*R. Pearson*. in Ibid., vol. i.—*Gumprecht*, in Ibid., vol. vi.—*Matthæi*, in *Horn*, Archiv, b. iii., hett 2, No. 1.—*Ettmüller*, in *Horn*, Archiv., b. vi., 2 heft, No. 15.—*Brera*, Giornale di Medicina, t. i., No. 4.—*Sprengel*, Geschichte der Arzneyk., b. iii., p. 96.—*Richter*, Therapie Spec., b. viii., p. 1.—*Vanderhuyden*, Dissert. sur la Coqueluche. Paris, 1812.—*Moutain*, in *Sedillot*, Journal de Médicine, 1812, Dec., p. 384.—*Kelch*, Dissert. de Unguento Tartari Stibiati adversus Tussem Convulsivam. Regiom., 1808.—*E. Löbenstein-Löbel*, Erkenntniss und Heilung der Hautigen Bräune, des Keuchhustens, &c. Leips., 8vo, 1811.—*P. E. Bourdet*, Dissertation sur la Coqueluche, ou Flux Gastro-Bronchique Tussiculeux. Par., 4to, 1812.—*G. Gallerand*, Essai sur la Toux Convulsive des Enfans. Par., 4to, 1812.—*J. Clossius*, Etwas ueber die Quellen, &c., des Keichhustens der Kinder. Hadamar, 8vo, 1813.—*Gardien*, Dict. des Sciences Médicales, t. vi. Par., 1813.—*R. Watt*, A Treatise on Chin-cough. Glasgow, 8vo, 1813.—London Med. and Surg. Repos., vol. i., 1814, p. 45.—*G. Penada*, Memoria sulla Tosse Convulsiva. Verona, 8vo, 1815.—*A. F. Marcus*, Der Keichhusten, ueber seine Erkenntniss, &c. Lips., 8vo, 1816.—*Meglin*, in Lond. Med. Repos., 1816, vol. v., p. 158.—*Rogers*, in Ibid., vol. vii., p. 285.—*Thomson*, in Ibid., vol. viii., p. 57.—*Kochler*, De Sede et Natura Tussis Convulsivæ. Prag., 1818.—*Magendie*, Recherches Physiologiques et Cliniques sur l'Emploi de l'Acide Prussique. Paris, 1819.—*A. F. Marcus*, Traité de la Coqueluche, ou Bronchite Epidémique (transl. by *Jacques*). Par., 8vo, 1821.—*B. Waterhouse*, On Tussis Convulsiva, or Hooping-cough. Boston, 8vo, 1822.—*J. Webster*, On the Seat of Hooping-cough (*in the Head*), Med. and Phys. Journ., Dec., 1822. Lond., 1822.—*Tacheron*, Recherches Anatomico-Pathologiques sur la Médicine Pratique, vol. iii. Paris, 1823; and Med. and Phys. Journ., vol. xliii., p. 346.—*Theod. Guibert*, Recherches Nouvelles sur le Croup et Coqueluche, 8vo. Paris, 1824.—*Theod. Guibert*, Archiv. Gén. de Méd., t. xvi., p. 202; et t. xx., p. 614 (*in Adults*).—*Kahleip*, in Ibid., t. xxi., p. 443.—*Kopp*, in Ibid., t. xvi., p. 289.—*Meyer*, in Ibid., t. xxi., p. 274.—*Guersent*, Dict. de Méd., t. vi. Par., 1823.—*A. L. Pierson*, Medical Dissertation on Chin-cough. Salem, 8vo, 1824.—*J. Frank*, Praxeos Med. Universa Præcepta, P. ii., vol. ii., sect. i., p. 823.—*Andrews*, in Glasgow Med. Journ., vol. i., p. 178.—*J. Alderson*, in Trans. of Med. and Chirurg. Soc., vol. xvi., p. 78.—*Laennec*, On Diseases of the Chest, 2d edit., p. 99.—*H. M. J. Desruelles*, Traité de la Coqueluche. Par., 8vo, 1827.—*Duges*, Dict. de Méd., et de Chir. Prat., t. v. Par., 1820.—*J. L. Schmidtmann*, Summa Observat. Med., t. iii., p. 415.—*Elliotson*, in Med. Gaz., 1832–3, p. 194 and 196.—*Johnson*, Cyc. of Pract. Med., vol. ii. Lond., 1833.—*Blache*, in Arch. Gén. de Méd., Nov., 1833, p. 325.—*Sandras*, in Encyclographie des Sciences Méd., vol. xii., L., p. 166, 1833.—*Guersent*, in Encyclographie, vol. xi., J., p. 261, 269; and vol. xiv., J., p. 367, and L., p. 221.—*Naumann*, Handb. der Medicinisch. Klinik., b. i., p. 321.—*Berndt*, Clinical Communication in Brit. and For. Med. Rev., July, 1836, p. 178.—*R. T. Evanson* and *H. Maunsell*, Pract. Treat. on the Management and Dis. of Children, 8vo. Lond., 1836, p. 363.—*Whitmore*, in Lancet, Oct., 1837, p. 97 and 129.—*Jadelot*, in Lancet, Sep., 1837, p. 909.—*M. G. Andral*, Cours de Pathologie Interne, &c., livr. troisième. Paris, 1837.

[Am. Bibliog. and Refer.—*Waterhouse*, Treatise on Hooping-cough.—*D. F. Condie*, A Practical Treatise on the Diseases of Children. Phil., 1844, and Am. Ed. of *Evanson* and *Maunsell* on the Management and Diseases of Children.—*W. W. Gerhard*, Lectures on the Diagnosis, Pathology, and Treatment of the Diseases of the Chest. Phil., 1842.—*James Stewart*, A Practical Treatise on the Diseases of Children, 2d ed., 1 vol., 8vo. N. York, 1844; also Translation of *Billard*, On Dis. of Children.—*John Bell*, Am. Ed. of *Underwood* on Diseases of Children, and Lectures on the Theo. and Prac. of Physic.—*G. Ackerley*, On the Management of Children in Sickness and in Health.—*W. P. Dewees*, A Treatise on the Medical and Moral Management of Children, 1 vol., 8vo. Phil.—*J. Eberle*, A Treatise on the Diseases and Physical Education of Children, 1 vol., 8vo. Phil.—*J. Thatcher*, American Modern Practice, &c., 1 vol., 8vo.—*R. Dunglison*, The Principles and Practice of Medicine, 2d ed. Phil., 1844.—*D. Hosack*, Lectures on the Theo. and Prac. of Medicine. Phil., 8vo (with Notes, by *N. Chapman*).—*William Gomage*, On the Hooping-cough, in New-Eng. Journ. of Medicine, vol. vi., p. 213; Ibid., p. 202, 343 (use of *belladonna* in).—*John Archer*, recommends Vaccination as a Remedy for Hooping-cough, in a Letter to *Dr. Mitchill*, Am. Med. Repository, vol. xii., p. 182, Nov. 8, 1808. *Dr. A.* remarks, "Vaccination is to be performed the second or third week of the hooping-cough, or when the symptoms are sufficiently manifest to determine that the person has the disease. When the vaccine disease has taken effect, and has proceeded to that period when the effervescence around the inoculated part disappears, and a scab is formed, and this scab assumes a brownish or a blackish appearance, the hooping-cough will be checked, and cease with the vaccine disease."—*A. L. Pierson*, Dissertation on the Diagnosis and Treatment of Pertussis. Salem, 1824, p. 51.—*J. A. Swett*, Lectures on Diseases of the Chest, in N. York Lancet, 1842–3.—*W. W. Valk*, Case of Pertussis immediately arrested by the use of Belladonna and Hydrocyanic Acid, in Am. Journ. Med. Sci., vol. vii., p. 417. (*Dr. V.* used the following formulæ: ℞ Pulv. Rad. Belladon., gr. j½; Pulv. Doveri, gr. 2½; Sulph. Præcip., ℈j.; Sacch. Alb., ℈ij. M. Div. in chart. 20; one powder every 3 hours, and between each dose 12 drops of the following: ℞ Aquæ Chamomil., ℥ss.; Sirup Simpl., ʒij.; Acid Hydrocyan., gtt. vj. M. (the child 7 months old).)]

HYDATID.—Syn. *Hydatis* (ὑδατις, a vesicle, from ὑδωρ, water). *Acephalocystis*, *Acéphalocyste* (from *a*, privative, κεφαλὴ, the head, and κύστις, a vesicle—a vesicle without a head), Laennec. *Vessie sans adhérence*, Cruveilhier. *Echinococcus Hominis*, Rudolphi and Bremser. *Polycephalus humanus*, *P. Echinococcus*, Zeder. *L'Echinocoque de l'Homme*, Lamarck. *Fischiosoma*, Brera. *Hydatide*, Fr. *Wasserblasse*, *Blassenwürm*, Germ. *Idutide*, Ital.

Classif.—I. Class, V. Order (*Author in Preface*).

1. Defin.—*Unattached vesicles, possessing a proper vitality, but dependant upon the parent body for the situations and conditions of existence.*

2. The term *Hydatid* has been very loosely employed by most writers, and even by many of the present day. It has been used by some as a generic appellation, not only for the several species of vesicular worms, or vesicles with one or more distinct heads, but also for the vesicular bodies now under consideration;

and by others the name has been very improperly extended to those simple *cysts* which are produced from, and connected with the surrounding tissues. In this article I shall consider only those vesicular bodies which do not possess distinct heads, but which present signs of a proper vitality, as constituting *true hydatids*; and shall refer the species, *Cystocercus*, *Polycephalus*, and *Ditrachyceros*, arranged by Cloquet, Kerr, and others, under this head, to that of *vesicular* worms. As to the species *Echinococcus*, described by Rudolphi, Zeder, and others, I believe it, with Brera and Bremser, to be merely a variety of the *acephalocystis*. Simple *cysts*, or pseudo-hydatids, are altogether distinct formations from those under consideration; but I shall also briefly notice them. (See art. Disease, § 113–115.)

3. The name *Acéphalocyste* was applied by Laennec to an organic production, consisting of vesicles or spheroidal globules contained in a distinct cyst, which isolates them from the surrounding tissues, and with which they have no kind of connexion. Although these productions scarcely merit to be elevated to the rank of a distinct species in animal existence, yet they must be considered, in pathology, to possess an individual vitality. They thus form one of the several species of *parasites* to which the human frame often furnishes origin and nutrition, and which not infrequently destroy the parent body. (See Parasitical Productions.) When it is considered that they present nearly the same form and appearance, that they are unconnected with the surrounding tissues, differing only as to size; originating, without any determined cause, in the very substance of our organs; developing and multiplying themselves; and manifesting their existence only by the compression of adjoining structures, whence often result the most serious effects, and even death itself, it must be admitted that they deserve a due share of attention.*

4. *Hydatids* were probably known to the ancients, although imperfectly; as Hippocrates, Celsus, Galen, and Aretæus mention the existence of cysts in many of the states of disease in which they are met with in the present day; but no precise description of them was given until 1685, when Hartmann directed attention to their animalcular nature. In 1691, Dr. Tyson published a paper (No. 193) in *The Philosophical Transactions*, "to prove that hydatids, often met with in morbid animal bodies, are a species of worms or imperfect animals." Since that time they have been particularly examined by Pallas, Linnæus, Muller, Hunter, Munro, Goeze, Bloch, Lamarck, Cuvier, Brera, Rudolphi, Zeder, Laennec, Bremser, Cloquet, Cruveilhier, and others.

5. I. Description of Hydatids, and of the Cysts containing them.—M. Cruveilhier remarks that, if we represent to ourselves soap-bubbles of various sizes, the contained air being replaced by a fluid of perfect limpidity, the envelope formed by a film of coagulated white of egg, we shall have a very exact idea of acephalocystes. They vary in size from a millet seed to that of the largest orange; their form is spheroidal; and their specific gravity is nearly the same as water, although they generally sink when plunged in this fluid. When compressed they resume their spheroidal form as soon as the pressure is removed. They are in general transparent and clear; sometimes only translucent; it is but rare that the fluid they contain is at all turbid. The various tints they present depend upon their envelopes, which have sometimes an opaline hue, either in particular points or throughout their surface. Frequently semi-transparent flocculi are seen swimming in the liquid, and appear reticulated or plaited. M. Cruveilhier considers these as the débris of the internal pellicle of the hydatid, and the result of changes after death. Their external surface is generally smooth, uniform, and without crotchets, or suctoria; and when their fluid is evacuated they present neither heads nor mouths—*Hydatis lævis*. If, therefore, they are to be considered as possessing individual animal existences, they are the simplest and lowest of animal creation. Examined with the microscope, the opaline appearance of their parietes proceeds sometimes from a thickening of the membranes forming them; at other times, from small whitish and hard granulations on their interior surfaces. They are without the smallest appearance of vessels of any kind.

6. When punctured, the contained fluid escapes in a jet tolerably strong and continued; the envelope, eminently elastic, contracts, and presents only about one third of its former capacity, and acquires double or treble its former thickness. Although transparent at first, it becomes semi-opaque, or opaline; and, although very extensible and elastic, it tears readily when it reaches the limits of extension. The fluid of an hydatid is not coagulated by heat, but it contains a little albumen and some salts, among which the chloride of sodium is predominant. The membrane, according to M. Collard, is composed of, *first*, an albuminiform substance, which, however, differs from albumen in being soluble in hydrochloric acid; *second*, of a substance analogous to mucus, but differing from mucus in its insolubility in alkalies; in its want of action on the acetate of lead; in its great solubility in the hydrochloric, sulphuric, and nitric acids, without the disengagement of gas; and in the circumstance of water restoring its physical and chemical properties after it has been dried. From these M. Collard infers that the hydatidic parietes consist of a peculiar substance.

7. Anatomically, they are composed, accord-

* [It is a well-known fact that hydatids may be produced in ruminants by confining them in moist places, and restricting them to very juicy, unripe vegetables. It is stated by Cruveilhier that, during several years in which he resided at Limoges, in France, comparatively few cattle were killed there that had not acephalocysts in the liver, lungs, or some other organ; and Prof. Gross remarks (*Path. Anat.*, vol. i., p. 138) "that in Cincinnati, where there are annually slaughtered upward of one hundred thousand hogs, probably not a tenth part are free from this disease; whole droves, consisting of three or four hundred, being sometimes thus affected. These animals," says Dr. G., "most of which are young, are raised in the prairie districts of Ohio, Indiana, and Kentucky, and are literally stuffed, for six or eight weeks before being sent to market, with fresh corn. The consequence is, that the portal circle is kept in a state of constant congestion, which finally leads to inflammatory irritation, and the development of acephalocysts in the liver and other viscera. The irritation thus set up is of a specific nature, and is followed by the deposition of a fibro-albuminous substance, or, what is the same thing, a sort of plastic lymph, the particles of which arrange themselves in such a manner as to create an inferior being, an entozoic parasite."]

ing to M. Cruveilhier, of four or five membranes, or laminæ, of unequal thickness, each membrane also varying in thickness at different points; whence result their various degrees of opacity and transparency. The small, whitish granulations, already mentioned, are frequently found on the interior surface of the larger hydatids; but they are often wanting, especially in the smaller. They possess no regular form, but are elevated on the internal surface, carrying before them the internal pellicle. Himly says that some hydatids possess another internal membrane, which is remarkably thin, but presenting here and there, or in groups, corpuscles of a glandular appearance; and that these enclose hydatids of a minute size, thereby illustrating the system of the enclosure of germes. Bremser has seen, in free hydatids, globules likewise unattached, in the interior of which still smaller globules existed, successive generations thus appearing in the same cyst. Dr. John Hunter and Laennec also consider the granulations or attached corpuscles to be young hydatids; and the numerous minute vesicles observed with the microscope diffused through the fluid contained in a hydatid to be of the same nature. Dr. Hunter remarks that, in their growth and decay, they pass through various stages: they are at first found floating in the fluid that fills the hydatid, and afterward attached to its coats. The hydatid, thus pregnant with young, adheres to the neighbouring parts, increases in size, and becomes itself a sac, containing numerous small hydatids. These, after a certain time, decay, and the skins or empty bags are squeezed together into a substance resembling isinglass; and it is probable that they undergo still farther changes.

8. Besides these minute granulations on the interior surfaces, and still minuter vesicles detected in the contained fluid, and considered by M. Cruveilhier to be the débris of the internal pellicle, as described above (§ 5), M. Laennec has remarked, in some instances, small germes, or sprouts, of an irregular form or size on the exterior surface. These he considers as nascent hydatids, which, in a certain stage of growth, are detached, and increase the number in the surrounding fluid. According to these writers, and to Dr. Baron and Sir A. Cooper, hydatids may be so produced as to form a number of concentric layers, resembling the crystalline lens, or the coats of an onion, with the fluid interposed between each layer. In such instances, it is to be presumed that the most internal is the last formed, and that the more external become condensed, and ultimately disruptured and altered by the development of those in the centre.

9. M. Cruveilhier distinguishes hydatids into *two varieties*—the *solitary* and the *multiplied*—the *Acephalocystis eremita vel sterilis*, and the *A. socialis vel prolifera*. The first is most common in the lower animals, the second in man. The former rarely is confined to one situation, organ, or part, but invades several organs, or even a number of parts at the same time; the latter is as rarely produced in several parts of the same body, or even in different parts of the same organ.—*a*. The *solitary hydatid* is often found in thousands in the lungs, the liver, &c., of ruminants. M. Cruveilhier observed them at the same time in the lungs, the spleen, the kidneys, and the heart of both sheep and oxen. The enveloping pellicle of the hydatid is altogether similar to that covering the interior of the cyst, but is without any kind of adhesion to it. This pellicle is semi-transparent, and presents a number of whitish points or granulations. The enclosing *cyst* is generally fibro-cartilaginous, and is not always spherical. Sometimes one or several partitions separate the cyst into as many cells, in each of which a hydatid is lodged, and exactly moulded. The tissue of the organs surrounding these cysts is quite unaltered.

10. *b*. The *multiplied hydatids* are always in greater or less numbers. From a hundred to a thousand may be contained in the same cyst or sac, varying from the size of a millet seed to that of the closed hand. They swim in a fluid presenting varying appearances. Sometimes this fluid is perfectly limpid; at others it is yellowish, especially in the hydatidic cysts formed in the liver; and it occasionally is puriform or purulent; yet, in this latter case, the hydatids themselves usually preserve their limpidity, a circumstance, among others, proving their independent existence. When the fluid of the cysts in which the hydatids are contained is otherwise changed, and especially when it becomes more consistent, or presents characters materially different from the above, the hydatids are disruptured, broken down, emptied, and apparently dead.

11. *c*. The *cysts* which enclose either variety (the solitary or multiplied) of hydatids are generally strong, and composed of several laminæ, which separate easily, and present the characters of fibrous tissue. They frequently contain cartilaginous or ossific patches; and the thickness of their parietes is usually in proportion to their size and age. They are externally adherent to the surrounding tissues by loose cellular substance; but they are occasionally attached more firmly by a cellulo-fibrous structure. The organ in which they are situated is commonly unchanged, but when pressure is exerted by them the surrounding parts are atrophied, or converted into a fibrous substance. The internal surface of the cysts is often rugose, and rarely polished or quite smooth. It has not the appearance of sero-fibrous surfaces, and yet it secretes the fluid in which the hydatids swim. It sometimes presents cracks or crevices, or solutions of continuity, from the distention caused by the growth of the hydatids, and increase of the fluid filling the cysts.

12. The hydatidic cysts are lined by a membrane, similar in all respects to that which constitutes the proper parietes of the contained hydatids, and presenting the same elasticity, fragility, colour, and physical and chemical properties. This membrane may be separated into several lamellæ. Its thickness is in proportion to its capacity. Its external surface nowhere adheres to the parietes of the cyst, and its internal surface is quite smooth. M. Cruveilhier considers it to be a large hydatid, enveloping and containing those which are smaller. It lines not only the cysts of the multiplied hydatids, but also those of the solitary. In the former, however, its internal surface is studded with minute granulations, some of which are isolated, and the others agglomera-

ted. These granulations, as in the case of those observed in the interiors of the larger hydatids, are doubtless the germes of the free and smaller hydatids.

13. When a morbid action exists in the parietes of the sac or cyst, or when they secrete pus instead of serum, then the enveloping acephalocyst is detached, and its debris are found mixed with the puriform secretion. The granulations or germes are also altered, and the contained hydatids are often more or less changed. In such cases the morbid secretion from the internal surface of the diseased cyst is destructive to the vitality, first, of the enveloping or parent hydatid, and consecutively of those which it contains.

14. The vitality and independent existence of hydatids are shown not only by their reproductive powers, but also by the preservation of the animal substances composing them from the changes, or the decomposition, which these substances always undergo when they lose their organic connexion with living parts. Yet, although thus possessing a certain, but a low amount of vitality, they cannot be elevated to the rank of animals; for they possess neither sensibility nor mobility, although their parietes present signs of organic contractility. They may be viewed, therefore, as the lowest or incipient states of separate animal organization, from which there is a gradual rise in the scale of existence, through the vesicular and flattened parasitic worms, up to the more perfect animals.

15. *d.* Hydatids undergo many *consecutive changes*, some of which originate in disease, either of their containing cysts, or of themselves. Occasionally these cysts break, either exteriorly or into a serous cavity, or upon a mucous surface; and this occurrence may be either fortunate or fatal, according to the situation in which it takes place. If the rupture occurs on a cutaneous or mucous surface, the admission of air causes prolonged suppuration. If it occurs in a serous cavity, which is rarely observed, fatal inflammation is thereby occasioned. Frequently, however, owing to the death of the hydatid, absorption of the fluid in the cyst takes place; the parietes contract, and approach towards the centre, and the remaining contents become remarkably changed, and often assume a tuberculous, putty-like, cheesy, or purulent form, the hydatidic membranes being pressed together, or otherwise altered. According to Ruysh, Bremser, and others, hydatids may thus degenerate into atheromatous, steatomatous, or melicerous tumours, especially when they occur in the ovaria. This opinion has been zealously and ingeniously argued for by Dr. Baron. He supposes that the hydatid, or vesicular form, is that in which tuberculous, scirrous, sarcomatous, steatomatous, and fungous productions originate; and that the transformation may take place at any period, or may not occur at all. The co-existence of hydatids with one or other of these formations has been urged in proof of this doctrine; but there has been no evidence of any of these having originated in hydatids, nor has the transition of the one morbid structure into the other been even partially demonstrated. The coexistence of these different productions in the same subjects, that is sometimes observed, and that furnished the chief basis of this doctrine, is merely a coincidence arising out of a fully ascertained circumstance—that the same states of constitution, of vital activity, and vascular action, which favour the production of the one structure, also predispose to the other.

16. II.—Pseudo-Hydatids, Simple Cysts, or *vesicles*, have been very commonly confounded with true hydatids. From this circumstance it will be necessary to take some farther notice of them at this place than has been taken in the article Disease (§ 113–115). They are found either entirely or partially in contact with the adjacent tissues, are supplied by these with the fluid they contain, and are nourished by them. Dr. Kerr has divided them into two varieties, viz., those which consist of *simple cysts*, or bladders capable of being detached without lesion of structure, and those which are *compound*, and which appear as diverticula from the subjacent membranous expansions, from which a separation at their bases cannot take place without laceration of a part essential to the integrity of one or the other.—*A.* Under the *former head* may be arranged, 1st, those cysts met with under the common integuments, that contain a sebaceous, atheromatous, or meliceritious substance, secreted by the cyst, and causing its distention; 2dly, those cysts formed by complete obstruction of a canal conveying secreted fluids, as ranula, those found in the labial glands, and the surface of the kidneys, &c.; 3dly, those proceeding from the distention of cells naturally existing in organs, by a morbidly increased and altered secretion, as in ovarian dropsy, and disease of the thyroid gland; and, 4thly, those serous cysts often found in the plexus choroides, sometimes in the eyelids, more rarely in the lungs, the female mamma, and other parts of the body. These last sometimes acquire a large size, especially when seated near the surface of any of the abdominal or thoracic viscera, and constitute encysted dropsy. The cysts belonging to this class are generally simple, distinct, and solitary. When two or more of them are developed in one part, as in the plexus choroides, the association is owing to the same cause which produced the one having likewise operated in its neighbourhood. This has been well shown by Dr. Hodgkin (*Med. Chirurg. Trans.*, vol. xv., p. 266).

17. The *formation* of this species of cysts, especially of those which cannot be referred to the obstruction of canals or orifices of ducts, has been a subject of much speculation. It has been supposed by some that they are produced by the obstruction and consequent dilatation of absorbents, or of other vessels not admitting the passage of red blood. This, however, is only a supposition. In a paper which I published in 1821 (*Lond. Med. Repos.*, vol. xv., p. 378), I suggested their origin in effusion into one or more cells of the areolar tissue, the state of the effused or secreted fluid, and the changes in the tissue immediately surrounding and confining the fluid, preventing the diffusion of the secretion in the adjoining parts, and giving origin to the parietes of the cyst. If serum accumulates in one or more of these cells, owing either to morbidly excited action, or to impaired absorption, in connexion

with an impermeable state of the surrounding tissue, this latter will be impacted around the collected fluid, and the albuminous portion of this fluid will attach itself to and line the sides of the cavity thus formed. As the effusion increases this cavity will enlarge; the parietes formed by the impacted areolar tissue will become firmer and denser; the albuminous portion of the secretion will continue to attach itself to the parietes, if it be in small quantity, where it will become organized, or even converted into a serous surface; and the cyst will present several coats or laminæ, thus produced from the condensed surrounding tissue, and from the successive depositions of albuminous pellicles on its internal surface from the secreted fluid. At the same time, it is not improbable that many of the simple cysts are actually formed before the fluid they contain, as supposed by Bichat, and as admitted by me in the article Disease (§ 115). The fluid in the cyst, particularly when it is thick, or more remarkably albuminous, or muco-albuminous, may undergo various changes, arising either from its properties at the time of its secretion, or from the states of local and general action and of constitutional or vital power. These changes may also be farther aided by partial absorption of its watery parts, or by the tendency of its chemical elements to form new combinations, when removed to a certain extent beyond the vital influence, and still subjected to an elevated temperature. To these circumstances may be attributed most of the appearances observed in the contents, as well as in the tunics of the class of *simple cysts*, and described in the article Disease (§ 113–115), whether the cysts are first developed as a serous membrane, or are formed by the fluid effused into the areolar tissue.

18. *B.* The *compound variety* of cysts (§ 16) are those whose parietes possess the property of producing other cysts of a similar character to themselves, or, as Dr. Hodgkin has shown, other morbid growths, which, if they do not present, strictly speaking, the character of cysts, are nevertheless referrible to the same type or mode of formation. Cysts of this kind, like simple cysts, are found in different parts of the body, but are by far most frequently seen, acquire the largest size, and present the greatest variety of appearances in connexion with the female organs of generation. In this variety, elevations more or less rounded, and of various sizes, are observed projecting on the interior surface of the principal cyst, and are covered by a membrane continuous with that lining the interior of this cyst. Dr. Hodgkin remarks that, on making an incision into these projecting elevations, they are found to be cysts of a secondary order, filled by a secretion, often serous, but almost as frequently mucous. On an intimate inspection of those secondary cysts, the germes of other or tertiary cysts are also found projecting from their interior surfaces, upon which is reflected the lining membrane of the cyst in which they are contained. Secondary cysts sometimes afford as complete specimens of a reflected serous membrane as either the pericardium or the tunica vaginalis, the lining membrane of the containing cysts corresponding to the reflected portion, as that covering the contained bunch of cysts does to the close portion. The proportion which the contained cysts bear to the cavity of the membrane reflected over them is extremely various. Sometimes the fluid, especially when it is serous, nearly fills the containing cyst, while the bunch of secondary cysts is of very inconsiderable size. At other times, the principal cyst is almost entirely filled by those of the inferior order, in which case the nodulous or tuberose elevations found on the exterior of the former are occasioned by the unequal development of the latter. It may even happen that the distention, caused by the growth of the contained cysts, is sufficient to produce a rupture of the containing cysts, which admits both of the escape of its fluid contents, and of the unrepressed growth of the secondary or tertiary cysts, which took their origin from its internal surface. As the inferior cysts themselves are found to contain, as Dr. Hodgkin has shown, a serous or mucous secretion, and very often to produce another order of cysts, possessing the same character with themselves, it is by no means surprising that these different orders of cysts, which sometimes have the appearance of delicate and pellucid vesicles, filled with clear and colourless serum, and possessed of the power of giving rise to a multitude of vesicles or cysts presenting the same character with themselves, should have been mistaken for true hydatids. But a little careful inspection would have shown that the bunches or clusters of secondary cysts are invariably attached to and continuous with the internal surface of the primary or containing cyst, and that delicate vessels ramify from the one upon the other.

19. It is reasonable to infer that these compound cysts will present diversified appearances, and give rise to various changes, according to their duration, to the state of vascular action in the parts in which they are formed, and to the constitutional or vital power of the patient, and that, according to the alterations which may take place in these cysts and in their contained fluids, adventitious formations of various kinds, and even scirrous and carcinomatous structures may be ultimately developed. My limits will not permit me to describe the various appearances which these compound cysts may present in different situations and at different epochs of development, or to trace the various changes they undergo, and far less to speculate upon their transformations into malignant or other structures. I must, therefore, refer the reader to Dr. Hodgkin's ingenious and able paper on this subject.

20. III. True Hydatids have been found in almost every organ or structure of the human body. Instead, however, of considering them at this place with reference to *their seats* in the brain, in the lungs, in the heart, in the liver, in the kidneys, &c., &c., I have, conformably with the plan of this work, noticed their occurrence in these organs in the articles devoted to the pathology of the several viscera. In these articles, as well as in some others, the *symptoms* they occasion, and the *treatment* they require in their various *localities*, are more fully and sufficiently discussed: I here confine myself to a general view of these subjects.

21. IV. Remote and Immediate Causes.—*a.* Attention to the circumstances in which hyda-

tids present themselves in man and in the lower animals proves that they generally originate in whatever impairs vascular activity and vital power; and of the causes which produce this effect, none are more influential than unwholesome and insufficient food, living too exclusively on vegetable diet, and residence in humid, cold, and low situations. Indeed, in the lower animals, they may be produced at will by insufficient nourishment, by humidity, and by food consisting chiefly of green succulent vegetables. Conjoined with these, debility arising from previous disease, convalescence from febrile or epidemic maladies, and the depressing passions, exert more or less power. There is reason, also, to infer that local injury, as well as local debility, has some share in determining the seat of these parasitic productions.

22. *b.* Various attempts have been made to account for their *origin*. Bidloo believed them to arise from the dilatation of lymphatic vessels, the valves forming a limit to the vesicles. M. Andral has recently attributed their origin to a deposite of a fibrinous clot in the areolar or other tissues. He supposes that a minute fibrinous concretion, secreted by blood-vessels in a state of morbid action, assumes an incipient form of organization, and that hydatids are an advanced grade of such organization. This supposition is supported by the well-known fact that fibrinous concretions formed on serous surfaces, although at first amorphous, ultimately become organized. As the origin of true hydatids is susceptible of the same explanation as that of the *Vesicular and other Parasitic* Worms, the reader is referred to what is advanced on this subject in the article Worms

23. V. Symptoms.—The formation of hydatids being attended by no appreciable lesion of function or of vascular action, the general symptoms are most uncertain, if, indeed, they be not entirely unascertained, especially in the early stages of this malady. Hydatids are developed so slowly and so entirely without vascular determination and excited action, that the organs in which they are seated adapt themselves to the pressure or slight displacement of parts they may occasion. When, however, they are seated within the cranium, or when their bulk in other situations becomes great, then the disorder they may occasion is made more manifest, although even then the constitution may not sympathize very remarkably with the local alteration. It very frequently happens that no idea has been entertained of the existence of these productions, in persons who have laboured long under slight ailments, until detected accidentally in a *post-mortem* inspection. It is only when the hydatidic cyst has acquired a volume so considerable as to give rise to a palpable or visible tumour that we can suspect its nature. In such cases the suspicion is rendered more probable when some degree of fluctuation, attended with a tremulous sensation, is perceived. This symptom, however, is illusory, for it attends other deep-seated collections of fluid. When, owing to the death of the hydatids, or to inflammatory irritation, or rupture of the containing cyst, suppuration affects this latter, then hectic fever, discoloration of the general surface, emaciation, and other attendants of organic lesion, take place. It sometimes happens that inflammation extends from the cyst to the adjoining parts, and that the morbid production thus makes its way either to the surface of the body, or into some internal cavity or canal. When it opens exteriorly, the nature of the malady then becomes manifest, and the recovery of the patient even possible.

24. VI. Treatment.—Our imperfect knowledge of the causes and symptoms of hydatids necessarily renders the prevention and cure of them also very imperfect. Such of the causes as seem to be more fully ascertained should be avoided, and those general principles of treatment, found to be most successful when the human body is the seat of parasitic productions should be adopted. I have shown, in the article Worms, that the chief principle of cure, next to the discharge of the parasitic animals, is to impart tone and vigour to the constitution, so as to enable it to resist their reproduction or increase, and to throw them off with the secretions and excretions, when a more immediate and direct removal of them cannot be effected. We may consider as axioms in pathology and therapeutics, that parasites form, multiply, and increase in proportion as the parent becomes weakened, and as the secretions and excretions accumulate or are retained, and that they diminish, and ultimately disappear with the full restoration of the vital power, and of the secreting and excreting functions of the animal which produced them. The practical application of these axioms to hydatids is very manifest. The principle being admitted, the selection of individual means will depend upon the seat of these productions, and upon the peculiarities of individual cases. In most instances, however, the preparations of iron, those of iodine, the iodide of iron, chalybeate mineral waters, camphor, and the balsams, the various vegetable and mineral tonics, and the promotion of the secretions and excretions by a combination of mild purgatives with stomachics and bitters, will be appropriate.

25. With respect to the propriety of *puncturing* the hydatidic cyst, in circumstances appearing to require this measure, much will depend upon its seat, with respect to the external surface, to serous membranes, and to internal canals; for where this operation is likely to risk effusion into an adjoining serous cavity, as into the peritoneum, or to induce inflammation of a serous membrane, it ought not to be attempted. When the cyst is seated near, or has reached the exterior surface; when inflammation and adhesion have obliterated any cavity intervening between it and the exterior; and when the integuments have become inflamed and acuminated, so as to point out the situation where only a puncture should be made, then it may be undertaken. As to the other points of treatment, they will come under consideration in the places where hydatids, seated in the internal viscera, are discussed.

Bibliog. and Refer. — *Aretæus*, Morb. Chron., l. ii., ch. i. — *J. P. Wurffbain*, in Ephem. Nat. Curios., Dec. ii., Ann. 9, p. 427.—*P. R. Hartmann*, in Ibid., Dec. ii., Ann. 7, p. 58. — *A. Camerer*, Acta Acad. Nat. Curios., vol. iii., p. 377.—*J. Grashuis*, in Ibid., vol. vii., p. 408.—*J. C. Pohl*, in Ibid., vol. viii., p. 388. — *J. H. Kannegiesser*, in Ibid., vol. vi., p. 310. — *J. Burg*, Miscell. Acad. Nat. Curios. Dec. 1, A. 9; et 10, 1678 and 1679, p. 435.—*J. H. Hünerwolff*, in Ibid., Dec. 3, A. 2, 1694, p. 207.—*A. Cleyer*, in Ibid., Dec. 2, A. 1, 1682, p. 40.—*J. M. Hoffmann*, in Ibid., Dec. 2, A. 5, 1686, p. 430.—*G. A. Mercklin*, in Ibid., Dec. 3, A. 1, 1694, p. 302. — *Bidloo*, Exercitat. Anat. Chirurg., Ex. ii., p. 10. De Hydatidibus. — *Davies*, Philos. Transact., 1701, p. 897.

—*E. Tyson*, in Ibid., No. 193.—*W. Musgrave*, in Ibid., 1705, p. 1797.—*A. Hewnden*, in Ibid., 1706, p. 2344.—*A. Littre*, Mem. de l'Acad. des Sciences de Paris, Hist., p. 31, 1704.—*J. Mery*, Mém. de Paris, Hist., p. 27, 1709.—*G. J. Du Verney*, in Ibid., vol. ii., p. 278.—*B. Anhorn ab Hartwiss*, Philos. Transact., 1722, p. 17.—*S. Morand*, Mém. de Paris, p. 158, 1722, and p. 23, 1723.—*W. Rutty*, Philos. Transact., 1723, p. 562.—*Maloet*, Mém. de l'Acad. de Paris, 1732, Hist., p. 25; Mém., p. 260.—*J. Lieutaud*, in Ibid., 1754, Hist., p. 74.—*C. N. Le Cat*, Philos. Trans., 1741, p. 712.—*C. Jernegan*, in Ibid., 1745, p. 305.—*W. Graham*, in Ibid., 1741, p. 708.—*W. Watson*, in Ibid., 1741, p. 711.—*H. D. Sporing*, Svenska Vetusk. Acad. Handl., 1743, s. 306; and Schwedische Akad. Abhandl., 1743, s. 246.—*Morgagni*, Caus. et Sed., &c., epist. xxxviii., 36, 45.—*A. P. Kölpin*, Schriften der Berliner Gesellsch. Naturf. Freunde, b. i., s. 348.—*W. Scott*, Med. and Philos. Comment. by a Soc. in Edinburgh, vol. v., p. 183.—*A. P. Nuhuys*, Verhandel. van het. Genootsch. te Vlissingen, deel. 3, bl. 453.—*J. Collet*, Med. Transact., vol. ii., p. 486.—*V. Menghinus*, Commentarii Bononienses, vol. ii., P. i., c., p. 142.—*Durand*, Annales de la Soc. de Médec. de Montpellier, vol. xxii., p. 366 and 357.—*Lamorier*, Mém. de Montpellier, vol. ii., p. 62.—*J. Paisley*, Med. Essays and Observat. by a Society in Edinburgh, vol. v., part ii., p. 766.—*Guattani*, Mém. de l'Acad. des Sc., &c., 1767, Hist., p. 71.—*C. A. Linnæus*, Systema Naturæ, vol. i., pars ii., p. 1320. Holm., 1767.—*L. Odier*, Mém. presentés à l'Instit. de Paris, vol. i., p. 176.—*Doubleday*, Med. Transact., vol. ii., p. 486.—*J. C. Lettsom*, Mem. of the Med. Soc. of London, vol. ii., p. 32.—*Aulagnier*, in *Sedillot*, Rec. Période. de la Soc. de Médec. de Paris, vol. lvi., p. 168.—*J. F. Schreiber*, Nov. Commentar. Acad. Petropolitanæ, vol. iii., Hist., p. 36; Mem., p. 403.—*Freteau*, Annales de la Soc. de Méd. Prat. de Montpellier, vol. xl., p. 157.—*Geoffroy*, Bulletin de l'Ecole de Médec. et de la Soc. de Paris, an. xiii., p. 164.—*Adams* and *S. Young*, in Bulletin des Sc. Méd., vol. ii., p. 378.—*E. Home*, Transact. of the Soc. for Promot. Med. and Chirurg. Knowledge, vol. ii., p. 300.—*P. S. Pallas*, de Infestis Viventibus intra Viventia, 4to. Lugd. Bat., 1760; and Miscellanea Zoologica, 4to. Lugd. Bat., 1778.—*F. Fontana*, Lett. sopra le Idatidi e le Tenie, in Opusculi Scelti, t. iv.—*M. E. Blochs*, Abhandlung von der Erzeugung der Eingeweidewürmer und den Mitteln wider dieselben, &c. Berlin, 1782.—Traduit en Français, 8vo. Strasb., 1788.—*F. B. Fynney*, Mem. of the Med. Soc. of London, vol. ii., p. 516.—*A. Russel*, Med. Observat. by a Society of Physicians in London, vol. iii., p. 146.—*Balme*, Journal de Médecine, vol. lxxxiv., p. 339.—*J. Lind*, in Ibid., vol. lxxix., p. 315, 1789.—*Pascal*, Dans la Médecine éclairée par les Sci. Physiq., par *Fourcroy*, vol. i., p. 87.—*J. F. V. Bonnet*, Sur les Vers Hydat. du Corps Humain, 4to, Mont., an. x.—*Eber*, Observ. quædam Helminthologicæ. Goetting., 1799.—*Fabricius*, in Nov. Act. Soc. Hafniensis, vol. xi., p. 287.—*Moorcroft*, in Medical Facts, vol. iii., No. 4.—*Wichmann*, Ideen zur Diagnostik, th. iii., p. 69.—*Bisset*, in *Duncan's* Med. Comment., vol. ix., p. 244.—*John Hunter*, Transact. of a Soc. for the Improvement of Medical and Chirurgical Knowledge, vol. i., p. 34.—*E. Home*, in Ibid., vol. ii., p. 300.—*S. F. Simmons*, Med. Communicat., vol. i., p. 101.—*Laennec*, Bulletin de l'Ecole de Médec. et de la Société de Paris, an. 13, p. 131, 162.—*J. B. Th. Baumes*, Annales de la Soc. de Médec. de Montpellier, vol. ii., part i., p. 3, 4.—*V. L. Brera*, Lezioni Medico-pratiche sopra i Principali Vermi del Corpo Umano vivente e le Cosi dette Malattie Verminose, 4to. Pavia.—*Veit*, in *Reil's* Archiv. f. d. Physiol., b. ii., p. 486.—*F. A. Treutler*, Obs. Anat. Pathol. Auctarium ad Helminth. Continent, obs. vii., 4to. Lips., 1793.—*Mongeot*, Essai Zoologique et Médical sur les Hydatides, 8vo.—*De Haen*, Rat. Med., vol. ii., part iii., cap. 16, sect. 2, p. 282.—*Fortassin*, Consid. sur l'Hist. Nat. et Médicale des Vers de l'Homme, 8vo.—*Schreger*, Sur les Fonctions du Placenta, vol. iv., p. 86.—*Richter*, Dans la Bibliotheque Germanique, vol. iv., p. 231.—*Lassus*, Journal de Médecine, par *Corvisart Leroux*, &c., vol. i., an. ix.; and Pathologie Chirurgicale, tome xi., 8vo. Paris.—*Blatin*, Mem. de la Société Méd. d'Emulat., an. vi., p. 165.—*Lallement*, in Ibid., an. iii., p. 321.—*J. A. E. Goeze*, Versuch einer Naturgeschichte der Eingeweidewürmer Thierischer Kœrper, Mit. 44. Kupfert, Leipzik, 1782; and Erster Nachtrag zur Naturgeschichte der Eingeweidewürmer, Mit. Zusætozen und Aumerkungen, herausgegeben von *J. Georg. Heinr. Zeder*. Mit. vi., Kupfert, 4to. Leips., 1800.—*T. G. Schrœder*, De Hydatidibus in Corpore Animali, præsertim Humano, repertis, sect. ii. Rintelii, 1790.—*Rudolphi*, Entozoorum sive Vermium Intestinalium Historia Naturalis, cum Tubulis Œneis. Paris, Argentor. et Amstel., 1810.—*M. Morrah*, Med. and Chirurg. Trans., vol. ii., p. 262.—*A. Marcet*, in Ibid., vol. ii., p. 375.—*L. G. A. Bosc*, Histoire Naturelle des Vers. Paris, 1802.—*J. G. H. Zeder*, Anleitung zur Naturgeschichte der Eingeweidewürmer, Mit. 4. Kupfert, Bamberg., 1803.—*A. M. C. Dumeril*, Zoologie Analytique. Paris, 1804.—*C. F. Becker*, in *Hufeland*, et *Himly*, Journ. der Prakt. Heilk., July, 1810, p. 115.—*Himly*, in Ibid., Dec., 1809, p. 140.—*Luderson*, De Hydatibus, 4to. Goet., 1808.—*De Reynal*, Annuire de la Soc. de Médec. du Départ. de l'Eure., 1809, p. 223.—*Chaussier*, in Ibid., 1807, p. 238.—*A. Monro*, An Essay on the Hydatids of the Human Body, 8vo. Edin., 1811.—*E. Petit*, Bulletin de la Fac. de Méd. et de la Soc. de Paris, 1812, p. 3.—*Le Sauvage*, in Ibid., 1813, p. 439.—*E. Gadelius*, Vetensk. Acad. Handl., 1815, s. 279.—*Th. Hedlund*, in Ibid., s. 272, 276.—*J. B. Lamarck*, Système des Animaux sans Vertèbres. Paris, 1816 and 1817.—*M. Baillie*, Morbid Anat., Edit. by *Wardrop*, vol. ii., *passim*.—*Devilliers*, in Ephém. des Sc. Nat et Médic., lib. xii., 8vo, p. 285. Paris, 1816.—*J. P. Frank*, De Curand. Hominum Morbis, l. vi., par. 1.—*Baron*, An Inquiry illust. the Nature of Tuberc. Accret. of Serous Memb., &c., 8vo. Lond., 1819.—*J. Baird*, in Edin. Med. and Surg. Journ., vol. xvii., p. 417.—*Meckel*, Handb. der Pathol. Anat., vol. ii., part ii., p. 394.—*H. Cloquet*, in Dict. des Sciences Méd., t. xxii., p. 156.—*Fosbrooke*, in Lond. Med. Repository, vol. xxi., No. 122, 125.—*J. Carlevarini*, De Hydat. Origine et Mutationibus Successivis, 8vo. Paris, 1825.—*J. G. Bremser*, Traité Zoologique et Physiologique sur les Vers Intestin. de l'Homme, &c., Traduit par *Grundler*, avec des Notes.—*De Blainville*, 8vo. Paris, 1824, p. 303.—*Alibert*, in Archives Génér. de Méd., t. xx., p. 106.—*T. Hodgkin*, in Trans. of Med. and Chirurg. Soc., vol. xv., p. 265; also Lectures on the Morbid Anatomy of the Serous and Mucous Membranes, vol. i., p. 183, 221. Lond., 1836.—*Cruveilhier*, in Dict. de Méd. et Chirurg. Pratiques, t. i., art. *Acephalocystes*.—*W. Kerr*, Cyclop. of Pract. Med., vol. ii., p. 434. Edin. Med. and Surg. Journ., No. 122, p. 13.—*J. Johnson's* Med. and Chirurg. Rev., No. 47, p. 255.—*J. F. Lobstein*, Traité d'Anatomie Pathologique, t. i., p. 534.—*J. B. G. Barbier*, Précis. de Nosologie et de Therapeutique, t. iii., lc. xxiv.

[Am. Bibliog. and Refer.—*Samuel D. Gross*, Elements of Pathological Anatomy, illustrated by numerous Engravings, 2 vols. 8vo. Boston, 1839.]

HYPERTROPHY.—Syn. *Hypertrophia* (from *ὑπερ*, above, and *τροφὴ*, nutrition), *excessive nutrition*. *Hypertrophie*, Fr. *Die Uebernährung*, Germ. *Enlargement of a tissue or organ from excessive nutrition.*

Classif.—General Pathology. *Morbid Structures, General Therapeutics.*

1. *Hypertrophy* is a term introduced by French pathologists to signify excessive nutrition of a tissue or organ, and often very loosely employed by them, and by some recent English writers, whose imitation of the former has been more close than judicious. According to the derivation and definition of the word, hypertrophy should be applied only to an increase of nutrition of a tissue beyond what is natural, and not to the augmented bulk arising from adventitious depositions in areolar or other structures. To this latter, however, it has been frequently applied by some recent authors. M. Cruveilhier has suggested a division of hypertrophy into the *physiological* and *pathological*; but the one variety frequently passes into the other, or the only difference between the two may be that of locality. All the pathological facts, he adds, relative to hypertrophy, may be referred to the three following heads: *first, simple and pure hypertrophy; secondly, hypertrophy with induration*; and, *thirdly, hypertrophy with transformation*. But, as M. Andral justly remarks, the term hypertrophy should be applied exclusively to those cases in which the tissue, whose volume is increased, retains its natural structure and organization. Hypertrophy, thus restricted, may exist in any one of the various elementary tissues, or even contemporaneously in two or more of them. It may also occur in organs formed by the combination of several of these tissues, and there affect only one, or extend itself to two or more. In either of these states, hypertrophy may be considered as a simple lesion, although it may be attended by increased firmness and density, which are generally observed to exist in hypertrophied tissues. It more frequently, however, occurs in complicated states, or associated with some transformation of, or deposition in collatitious

or adjoining textures. In such cases it is difficult to determine whether the hypertrophy or its associated alteration is the primary lesion, or how far the one may be dependant upon the other. In many instances of hypertrophy of one tissue, the collatitious tissues are more or less atrophied; in this case the sequence and dependance of change are manifest. From these considerations, hypertrophy may be divided into, 1st, the *simple*, and, 2d, the *associated* or *complicated*; the latter, however, being so diversified as to preclude a description sufficiently brief and consistent for this article. The subject, however, under both these heads is sufficiently discussed in the articles devoted to the pathological anatomy of the individual tissues and organs.

2. I. Nature of Hypertrophy.—When this change occurs simply, without any associated alteration, it can be referred only to an excess of nutritive function; and an active state of the circulation, dependant upon increased nervous power, may be considered as the conditions requisite to this excessive state of nutrition. This fact is proved by the physiological consideration of the subject, especially by those employments in which particular muscles are principally exercised and consequently developed. In these instances, volition determines a more frequent and energetic contraction of certain muscles, and such contractions require an increased supply of blood: whence, ultimately, results augmented development. What is familiarly demonstrated in the voluntary muscles also takes place in the involuntary, under analogous circumstances; thus, the constant or repeated efforts made by the ventricles of the heart, by the parietes of the stomach, by the urinary bladder, or even by the intestinal canal, to overcome an obstacle placed at their outlets, or to procure a free passage for their contents, are followed by excessive development of their muscular structures, and are attended by a relative increase of their vascularity. In these instances, the first change in the hypertrophied part is manifestly excited or increased organic nervous influence. This determines not only excessive muscular contraction, but also augmented vascular determination, and, as the general result, superabundant nutrition. On this point, the opinion of Dr. Carswell, who has written with more precision on this subject than any of his contemporaries, does not materially differ from my own. He fully admits that an increased supply of blood is necessary to hypertrophy, but has left out of consideration the share which the nervous power has in the production both of this increase, and of the excessive nutrition which follows. He justly remarks that the nature of hypertrophy merits due consideration, as involving the principle on which the treatment of it should be founded, and as establishing a law directly opposed to the doctrine that this lesion is the primary element of certain adventitious structures. M. Andral has proposed this doctrine, and has contended that hypertrophy of the cellular tissue forms a necessary condition in the production of scirrus and carcinoma. But, although the cellular tissue may be more or less hypertrophied in these maladies, this alteration is associated with others less physiological, and infinitely more morbid than it in their vital and organic relations.

3. II. Causes and Origin.—Hypertrophy, in some of its forms, or with reference to certain tissues, may depend upon a predisposition existing in the organization. Some persons have an hereditary predisposition to an excessive development of the adipose tissue; obesity occurring in these, however abstemious they may be. Others present also an hereditary predisposition to enlargement of the bones, or of the lymphatic, or other glands. The common *exciting causes* of hypertrophy are, *first*, the increased action of a tissue or organ; *secondly*, the prolonged influence of an irritant or stimulus. Either of these classes of causes may induce hypertrophy, in its *simple* or *complicated* forms.

4. *A. Increased action or function* of a part gives rise most frequently to hypertrophy in its *simple form*. It then may be considered as purely *physiological*; thus, the blacksmith has the muscles of his arms powerfully developed, and the opera-dancer those of his lower extremities. The hypertrophy in such cases is frequently attended by an atrophy of other muscles not brought into action. The drayman, or coalheaver, has the muscles of the arms and trunk strongly formed, while those of the legs are imperfectly developed, their action being confined or entirely suppressed, by the thick-soled shoes they are accustomed to wear, and by their shuffling gait. Increased function, or action of the heart, is often followed by excessive nutrition, even independently of lesion of the orifices and valves. Obliteration of an arterial or venous trunk causes enlargement of the collateral vessels. Destruction of one kidney, or of one lung, gives rise to marked augmentation of the size of the other. Obstacles to the evacuation of the contents of the hollow viscera occasion hypertrophy of the parietes of these viscera, owing to the increased action required to overcome these obstacles; but the increased action in such cases operates similarly to that produced by excited function in the circumstances just adverted to.

5. *B. The protracted operation of a morbid stimulus or irritant* is the most common cause of these forms of hypertrophy, which may be denominated *pathological*, and which are most frequently *complicated*. These forms were arranged by Dupuytren under the denomination of *nutritive irritations*. They are not always instances of pure hypertrophy; but, as they often result from a state of chronic inflammation, so they are attended with, and even partially dependant upon, a deposition of coagulable lymph, which has become more or less organized and identified with the tissues in the areolæ of which it has been effused. There is every reason to believe that many of the cases of hypertrophy said to have been observed in the cellular, serous, mucous, and glandular structures, either singly or complicated with other lesions, were actually referrible to this category. Indeed, it is by no means easy to distinguish the enlargement caused by the effusion of lymph, which has become thus organized, from pure hypertrophy, particularly as respects the tissues just enumerated, and when other organic lesions are also present in the affected part. That, however, hypertrophy ac-

tually takes place from prolonged irritation, is proved by the changes produced by this cause in the integuments, the mucous and serous surfaces, the cellular tissue, &c. Most of the forms of associated or complicated hypertrophy, noticed in the articles on the pathological anatomy of the different tissues and organs, are referrible to causes which fall under this head.

[We see the influence of this cause well illustrated in hypertrophy of the mucous and sub-mucous membrane of the stomach from the irritation of alcoholic drinks, and of the liver and spleen from the effects of the same agent; the thickening of the same textures, and even of the muscular tunic, in chronic dysentery, in which we are able to trace with the utmost ease follicles and villosities, which, in the healthy state, are imperceptible to the naked eye; we also see hypertrophy of the mesentery, from ulceration of the ileum; of the bronchiæ, from disease of the lungs; of the coats of the urinary bladder, from chronic inflammation of that organ.]

6. III. CHARACTERS.—*a*. Increase of *bulk* is not always characteristic of hypertrophy; for hollow viscera, as the heart, stomach, urinary bladder, &c., may have their parietes very much thickened without their dimensions being externally augmented. Hypertrophy may exist even although the apparent bulk of the organ is diminished. In such instances the thickness of the parietes must be considered with reference to the external dimensions and internal capacity of the organ.—*b*. The *form*, also, of a tissue or part will also be changed or modified in some degree, but chiefly when the hypertrophy is circumscribed. This is demonstrated most remarkably in cases of hypertrophy of the bones, skin, mucous tissues, &c.—*c*. The *consistence* of the hypertrophied part is generally somewhat altered. It is most commonly more or less increased, particularly in the cellular tissue, lymphatic glands, brain, skin, &c. Diminished consistence is never met with, excepting in some rare instances of complicated hypertrophy, when the enlarged tissue has experienced consecutive change.—*d*. As increased size, and generally, also, augmented density, or firmness of the hypertrophied tissue, obtain, it must necessarily follow that the *weight* of the part is also greater.—*e*. The *colour* is increased, unless the blood-vessels are compressed by the enlarged structure; as sometimes observed in the brain, in the bones, and cellular tissue.

[Where the hypertrophy is purely physiological, the colour of the part will be heightened; but we often find it diminished from causes not very obvious. Sometimes the colour of the part is entirely natural; at other times of a lighter hue than observed in health.]

7. IV. The EFFECTS of hypertrophy are, 1. Increased action relatively to the augmentation of size, as in hypertrophy of the heart, of the urinary bladder, &c. 2. Compression and atrophy of the collatitious textures, particularly when one or more of the tissues of an organ or part is enlarged. 3. Diminution of a cavity, or of the canal of an organ, as in concentric hypertrophy of the ventricles, and in some instances of hypertrophy of the urinary bladder, or of portions of the digestive tube. 4. Compression of adjoining organs, when a viscus is greatly enlarged; and, 5. Augmented development of the vascular system of the hypertrophied part.

8. V. The GENERAL TREATMENT of hypertrophy may be conducted with the following *intentions*: 1. The removal of the exciting and pathological causes, when this can be attempted. 2. The diminution of the quantity and richness of the blood, by depletions and low diet, as far as may be consistent with the circumstances of particular cases, and localities of this lesion. 3. The prevention of local determination of blood, particularly to the hypertrophied organ or part, and the derivation of it to other situations. 4. The avoidance of local and general excitement, and the procuring, as much as possible, the repose of the affected organ. All these intentions are not equally applicable to every case, and some of them should be entertained with caution in certain circumstances. Thus, when hypertrophy depends upon repeated efforts to evacuate fully an organ, the second indication ought to be either very cautiously or very partially fulfilled. The particular means or remedies which may be selected to accomplish these intentions should depend entirely upon the seat of the lesion, and the peculiarities of individual cases; they are fully noticed in the places where the particular forms of hypertrophy are discussed.*

BIBLIOG. AND REFER.—*J. F. Meckel*, Manuel d'Anat. Génèr. Descrip. et Pathol., &c., par *Jourdan* et *Breschet*, 8vo, t. i., *passim*. Paris, 1825.—*J. B. G. Barbier*, Précis de Nosologie et de Thérapeutique, 8vo, t. i., p. 414. Paris, 1827.—*J. F. Lobstein*, Traité d'Anatomie Pathol., 8vo, t. i., p. 51. Paris, 1829.—*Cruveilhier*, Dict. de Méd. et Chirurg. Pratiques, t. x., p. 218.—*A. W. Otto*, Compend. of Hum. and Compar. Pathol. Anat., transl. by *South*, 8vo, vol. i., p. 26. Lond., 1831.—*G. Andral*, A Treatise on Pathol. Anatomy, transl. by *R. Townsend* and *W. West*, 8vo, vol. i., p. 202. Dublin, 1829.—*R. Townsend*, Cyclop. of Pract. Med., vol. ii., p. 523.—*R. Carswell*, Illustrations of the Elementary Forms of Disease, fasc. ix. Lond., 1836.

HYPOCHONDRIASIS. — SYN. Ὑποχονδριον, the Hypochondre; ὑποχονδριακος, adj. (from ὑπὸ, under, and χονδρος, cartilage). *Hypochondria*, Auct. Lat. *Morbus Flatuosus*, Diocles and Aëtius. *Malum Hypochondriacum*, Galen, Hoffmann. *Morbus Hypochondriacus*, Fracastori. *Morbus Resiccatorius*; *Morbus Ructuosus*; *Passio* vel *Affectio*, vel *Melancholia*, *Hypochondriaca*, Auct. var. *Mater Scorbuti*, De Barbette. *Hypochondriasis*, Sauvages, Linnæus, Cullen. *Hallucinatio Hypochondriasis*, Crichton. *Alusio Hypochondriasis*, Good. *Dyspepsia Hypochondriasis*, Young; *Hypochondrie Maladie Imaginaire*, Fr. *Die Hypochondrie*, *Grillenkrankheit*, Germ. *Ipochrondia*, Ital. *Neuropathy*, I. M. Gully. *Hypochondrism*, *Hyp. Vapours*, *Hypochondriasis*, *Low Spirits*, *Hypochondriac Passion*, *Nervousness*.

CLASSIF.—2. *Class*, Nervous Diseases; 2. *Order*, from want of vital power (*Cullen*). 4. *Class*, Diseases of the Nervous Func-

* [We sometimes meet with hypertrophy of some external part of the body, as of the lip, &c., which it is desirable to remove. In such, the repeated application of leeches, with local pressure, the application of ice, and attention to the general health, will usually suffice for its cure. In the 3d vol. of the *N. Y. Jour. of Med.*, a case of this kind is related by Dr. DETMOLD, successfully treated in this manner, together with abstinence from animal food, and every third day a saline aperient. Six applications of leeches, three every fortnight, sufficed for a perfect restoration of the lip to its natural size; resolution appeared to be the consequence of the erysipelatous inflammation caused by the leech-bites.]

tion; 1. *Order*, Affecting the Intellect; (*Good*). I. Class, IV. Order (*Author in Preface*).

1. Defin.—*Chronic indigestion, with languor, flatulency, dejection of mind and fear, arising from inadequate causes; general exaltation of sensibility; a rapid succession of morbid phenomena, simulating numerous diseases, or otherwise a real, but variable state of suffering, exaggerated by the morbid sensibility and fears of the patient, with unsteadiness or variability of purpose, and distressing anxiety respecting his complaints.*

2. *Hypochondriasis* has been very differently arranged by nosological writers. Vogel placed it among spasmodic diseases, and Cullen, much more correctly, in that order of nervous complaints which depend upon defective vital power. Sauvages, Linnæus, Pinel, and Good have included it in the class of mental affections, and viewed it as nearly allied to insanity. I agree with Dr. Prichard in considering the arrangement of these latter writers not to be justified by the history of the disease, and for reasons that will be stated under the head of *Diagnosis*.

3. I. Description and History.—*A.* The *first*, or *slightest degree*, or *stage* of this malady is generally confined to disorder of the digestive organs, its invasion and progress being commonly slow. However, in a very few instances, its attack is sudden, and its course more rapid. The disorder of the digestive organs is always real, although more or less exaggerated, and attended by a sentiment of general uneasiness or distress, referrible to an increased susceptibility, or morbid sensibility, especially of the organic nervous system. The appetite is sometimes not affected, but it is occasionally variable or deficient, or even excessive. Digestion is slow and difficult, and the patient complains of pain, oppression, or distention in the stomach, or hypochondres after a meal. These sensations are attended and aggravated by flatulency and borborygmi, and sometimes by acid or acrid eructations. Occasionally the abdomen feels hard from flatulent distention, and various symptoms characteristic of chronic indigestion, as cardialgia, sense of heat in the course of the œsophagus, nausea, hemicrania, twisting or griping pains in the abdomen, &c., are complained of. In a few instances the appetite is perverted, particularly in hypochondriacal females, or during pregnancy, a morbid desire for indigestible or the most improper substances being present. Thirst is seldom much complained of. The tongue is commonly loaded or covered, towards the root and middle especially, and particularly before breakfast, with a mucous coating. The mouth is clammy, and the taste somewhat perverted. The breath is generally offensive. The nausea is sometimes attended with a vomiting of mucous fluid, or of an acid matter, with half-digested food, and sometimes with a sort of salivation. The flatulence of the digestive canal excites, or is accompanied by sympathetic pains in various situations, which are alleviated by eructations, and especially by the expulsion of the air downward, but these pains usually return, although not always in the same place, or with the same characters. The bowels are generally costive, but they are occasionally irregular; constipation, with colicky pains, sometimes alternating with diarrhœa. The relaxation of the bowels seldom affords relief; and when it is prolonged, it often increases the anxiety, depression, and nervousness of the patient. The urine is occasionally natural, but it has frequently been observed by Sydenham, Hoffmann, and Cheyne more than usually limpid and abundant. It is sometimes loaded, or deposites a copious sediment, as in dyspeptic cases. Palpitations in the heart and in the epigastric region are sometimes felt, and excite great uneasiness in the patient's mind.

4. *B.* The *second degree* or *stage* of the complaint is even still more diversified than the preceding. The symptoms already detailed continue undiminished, are often aggravated, and are accompanied by others, referrible to the brain and organs of sense, and sometimes, also, to the thoracic viscera. Yet, notwithstanding the severe train of symptoms and distressing feelings of the patient, he frequently presents the appearance of sound, or even robust health. He often complains of violent pains in the temples, forehead, or occiput, or of general headache, with dimness of sight, and noises in the ears; or of a sense of weight or pressure, more intolerable than pain, at the vertex, with giddiness or confusion of mind; and sometimes of a constriction, or tightness in the head or temples, or of a morbid sensibility of the scalp and roots of the hair. Occasionally the senses are morbidly acute and intolerant of light and noise. Pains resembling rheumatism, or those of syphilis, are felt in various situations, occasionally with a feeling of burning or heat, and sometimes with coldness, horripilations, numbness, cramps, feebleness, or threatened paralysis of one or other of the extremities. Weakness of the limbs, unsteadiness in walking, or feebleness of the joints (in some instances with neuralgic pains), and great susceptibility to cold and heat, are not unfrequently also complained of. The morbid sensibility of the hypochondriac is generally increased by a cold and humid state of the atmosphere, by easterly winds, and by very warm seasons. His mind is incapable of exertion or prolonged attention, although, when aroused, he may be lively and acute; but he soon becomes engaged with his own feelings and sufferings. To these he frequently recurs in conversation, whenever he has an opportunity of doing so, although he seems to suspect that the subject is unpleasant to those who listen to him, and therefore suppresses a part of his complainings. In some cases there is dyspnœa, constriction of the chest, with a dry, short, or spasmodic cough, and occasionally a sense of suffocation or constriction is felt in the throat, with flatulence and various other symptoms resembling those attendant on hysteria. These phenomena have induced several writers to consider the disease closely allied to hysteria, and the severe palpitations, or irregular action of the heart, frequently also complained of, have farther countenanced the idea; while they have excited the anxiety of the patient, and induced him to believe himself the subject of irremediable disease of the heart. Sleep is sometimes not materially disturbed, and occasionally the hour of repose is ardently looked for; but in other cases it is dreaded as aggravating the distress. Generally, as the dis-

ease advances, unquiet and distressing dreams, restlessness or insomnia, incubus and nervous agitations are more or less complained of.

5. *C.* The *third or confirmed grade* of this malady presents nearly the same phenomena as have been detailed, but in a somewhat heightened and chronic form. The complaints of the patient have been varied, and a succession of most of those enumerated have been experienced. The patient is often tortured with the most distressing feelings, which are greatly aggravated by his fears. He dreads impending dissolution, from the symptoms referred to the head, heart, or chest. His ideas are concentrated on himself and his feelings, and he is incapable of attention or mental exertion, unless aroused by circumstances of unusual interest or moment. This mental incapacity is increased by an idea that his faculties are impaired, and by his dread to exert them. Occasionally vertigo, dimness of vision, or intolerance of light and noise, are so great as to justify his fears; and the pains in the head, or the sensations of pressure on the head and temples, are so severe that the eyes feel as if starting from their sockets. At the same time, the organic sensibility of the digestive canal is so acute that the progress and operation of a dose of medicine are traced by him through the different compartments, and made objects of comment. Palpitation is felt at the epigastrium and about the cœliac axis, and is sometimes attended with sensations of throbbing, extending to the extremities. Disorder of the digestive functions still continues more or less marked, and the tongue is either loaded or covered with a mucous coating, or is flabby at its edges. The pulse is seldom very materially affected, unless the patient be subject to palpitations or irregular action of the heart. In this advanced or prolonged state of the disease, the countenance of the patient often presents an air of distress or suffering. In some cases it becomes sallow, but in others his appearance has no relation to the intensity of the sufferings he expresses. While most of the faculties of the mind are more or less weakened, the imagination is morbidly active, and is constantly engaged with the consequences or results of the disease of which he believes himself the subject. His desire and hopes of recovery, however, prevent him from being weary of life, or from entertaining an idea of terminating it. On the contrary, he is most anxious to obtain relief, but is frequently unsteady in the use of means calculated to afford it. He has recourse to a variety of opinions, and is more ready to adopt what is recommended for his restoration than to persevere in its employment, or to continue under the direction of the physician whom he has consulted.

6. II. Associations or Complications.—Judicious observers who have studied the course of this malady will agree in believing that the symptoms characterizing it are by no means imaginary. They evidently depend upon physical disease, in connexion with a morbidly exalted state of sensibility. This physical disease commences in the digestive organs, attended with morbid organic sensibility, which extends to the cerebro-spinal nervous system, thereby aggravating and multiplying the morbid phenomena. The lesions, therefore, observed in the course of the malady, whether functional or structural, can hardly be denominated complications. They are rather integral or necessary parts of the malady, rendered more prominent, however, by the distressing feelings which they excite, or with which they are associated. In addition to the functional disorder of the *stomach*, and other chylopoietic viscera characterizing this complaint, the digestive canal often presents evidence of marked irritation, amounting, in some cases, to asthenic inflammatory action, or even to structural lesion of the mucous surface. The secreting function of the *liver* is also often disordered, and symptoms of congestion or engorgement of this organ, or even of inflammatory action, may occasionally be detected; and in these affections the *gall-bladder* and *ducts* not unfrequently participate. The *spleen* is sometimes enlarged, and occasionally in connexion with disorder in the biliary apparatus. Hypochondriacs often are subject to *hæmorrhoids*, owing to local or general plethora, or to costiveness, or to the use of irritating cathartics. This connexion has been noticed by Hippocrates, Galen, Stahl, Hoffmann, Alberti, Highmore, and others, and has been considered as being salutary in plethoric hypochondriacs, and when the hæmorrhoidal flux has not been excessive or debilitating. Some writers, particularly Koch and Buchner, have viewed the hæmorrhoids as the cause of the hypochondriasis; and I have met with cases which countenance the opinion, as well as with others which militate against it, and show that the removal of the former has increased the latter, by augmenting plethora, and disposing to affections of the brain. I was very recently consulted by a gentleman, who had been subject to hæmorrhoids and hypochondriasis in its slighter form, the discharge from the former always relieving the latter for a time. The hæmorrhoidal affection was cured by surgical treatment; but the hypochondriasis was afterward remarkably aggravated, and was followed by painful spasm and irritation about the sphincter. He consulted another eminent surgeon, who divided the sphincter; but the operation was succeeded by inflammation of the rectum, extending along the colon, with the usual dysenteric symptoms, fever, and the utmost distress. These having been subdued, the complaint in the rectum continued unmitigated, and the patient's hypochondriacal sufferings increased to the utmost. In this case the local treatment, which was obviously injudicious, remarkably aggravated the disease.

7. Hypochondriasis either seldom occurs in females, or occurs only in a slight degree, as long as the catamenia continue regular; but when they are suppressed or diminished, or disappear at the natural period, it occasionally commences, or is aggravated. It may also occur in a slight form during *pregnancy*, and subside or disappear after delivery. Of this I have seen more than one instance. Pregnancy may also relieve this complaint when the patient has been labouring under it for some time previously. *Organic disease*, or *irritation* of the *uterus*, is one of the most frequent associations of hypochondriasis in this class of patients; and it may, moreover, not be the only one in the same case.

8. The symptoms referrible to the *head* are not always dependant alone upon altered or exalted sensibility. In addition to this state there is often also congestion, or deranged circulation in the brain; but the cerebral affection is generally consecutive upon disorder of the digestive functions, and upon increased sensibility of the organic or ganglial nervous system, even although the chief cause of the hypochondriasis has acted primarily upon the mind.

9. Hypochondriasis may be excited in the course of some organic malady, by the patient's attention being suddenly directed to the seat of disease, although his feelings and spirits had not been previously affected. This is not unusually the case with *organic affections* of the *heart*. I have seen more than one instance where the detection of disease about the valves, or a particular examination of the heart by auscultation and percussion, led the patient to suspect what really existed; and the suspicion soon amounted in his mind to certainty—his fears and distresses becoming even painful to the observer. The connexion of hypochondriasis with the *gouty diathesis* has seldom been adverted to by writers; yet I have met with several cases where the former has come on after the suppression or disappearance of gout. In such cases, disorder of the abdominal viscera is more or less marked, and is sometimes associated with deranged circulation in the brain. Indeed, this may be said to be one of the forms of misplaced gout: hypochondriasis, when prolonged or neglected, or aggravated by injudicious treatment, may pass into *melancholy*, or even into *insanity*; but this is much more rare than is supposed. In these instances, melancholic ideas, or some single delusion, is entertained, while the primary disorder either continues unchanged or is partially absorbed in the superinduced malady.

10. III. Duration and Terminations.—*a*. The *duration* and *progress* of hypochondriasis are most indefinite. The accession of it is generally gradual and imperceptible, unless when caused by some overpowering impression or mental emotion. When judiciously treated in its slighter forms, or during early periods, this complaint may be removed after a comparatively short time; but, otherwise, it may continue for years, with various mutations, and with indefinite periods of relief or exacerbation, depending partly upon the permanence of the causes, on the state of the season, or the occupations and amusements of the patient, or upon whatever may affect his general health and constitutional powers. It may even spontaneously cease for a time, and return again and again; or it may continue through life, without apparently shortening its duration; but, more frequently, the functional, or structural lesion producing it gradually increases, until visceral disease of a very obvious kind is developed, and shortens existence, under the care of some practitioner who, most probably, had not witnessed the earlier progress of the malady.

11. *b*. The *terminations* of hypochondriasis are, 1st, in the restoration of health by medical treatment; 2dly, by critical evacuations and spontaneous recovery; 3dly, in the development or supervention of organic or fatal visceral disease.—*a*. The *first* of these can be accomplished only slowly, and by judicious recourse to medicine, regimen, and moral discipline.—*b*. *Critical evacuations* are rarely observed. *Diarrhœa*, particularly when caused by a copious secretion of bile, and followed by a resolution of hepatic engorgement or biliary obstruction, occasionally affords some relief; but it rarely removes the complaint unless it be aided by additional means. The same remark applies equally to *hæmorrhagic discharges*. They furnish, however, indications of what should constitute, at least, a portion of the treatment in many cases. The spontaneous appearance of *cutaneous eruptions* has been noticed by Boerhaave, Lorry, Van Swieten, Heim, and Reil, as favourable occurrences; and enlargement of the external glands had also been considered critical by Stoll, Klein, and others.

12. *c*. *Organic*, or *fatal visceral disease*, is more liable to occur in hypochondriacs than in other persons, or than is commonly supposed. The parts most frequently undergoing structural lesion, are the stomach, liver, and biliary apparatus, the brain and membranes, the large bowels, the heart and large vessels, the spleen, pancreas, uterus, and kidneys. Functional disorder of some one of these, in connexion with derangement of its circulation, and with exalted organic sensibility and nervous susceptibility, most probably gives origin to most of the patient's sufferings; and as these disorders proceed onward to organic lesion, the malady advances, until this lesion is expressed by signs much less equivocal than those attending the earlier stages of the hypochondriacal affection. Insane delusions, melancholy, palsy, or epilepsy, may thus supervene from progressive structural change; but the former of these are by no means so common as is generally believed. Palsy is not a frequent, and epilepsy is a comparatively rare termination of this malady. Organic lesions of the heart and pericardium, as well as of the large bowels and urinary organs, are, however, oftener observed than has been supposed. The structural changes met with in advanced or old cases of hypochondriasis are chiefly the following:

13. IV. Lesions of Structure.—Various changes have been observed in the *digestive mucous surface*, the most important of which have been congestion, partial softening, discoloured spots, and slight ecchymoses. Thickening of the coats and induration, or an incipient state of scirrus of the pylorus, or cardiac orifice of the *stomach* (Bonet, &c.), have been more rarely met with. The *liver* has presented various lesions, the chief of which have been congestion, enlargement of the organ, and dilatation and engorgement of the vena portæ (Lieutaud). I have found the *hepatic ducts* and *gall-bladder* distended, enlarged, and filled with dark inspissated bile. Gall-stones have also been found in the bladder and ducts. Alterations of the *spleen* have been observed by Bonet and others, and of the *pancreas* by Brandis. The *large bowels*, especially the sigmoid flexure of the *colon*, the *cæcum* and *rectum*, frequently present changes similar to those noticed with reference to the digestive mucous surface generally, or are thickened, or somewhat contracted, and the colour is sometimes displaced. Hæmorrhoidal tumours are often met with. A plethoric, engorged, or congested state of the abdom-

inal viscera generally, has been remarked by THEDEN, BURGGRAU, and LEUTHNER. I have found calculi in the *kidneys* in one instance, and enlargement of the prostate gland and disease of the *bladder* in another. Alterations of the *uterus* have been noticed by some writers; and I believe that they are not rare in connexion with hypochondriasis, especially after the change of life.

14. Organic disease of the *heart* and *large blood-vessels* is not unfrequent in hypochondriacs; but instances in which the structure and orifices and valves of this organ have been accurately examined after their death are remarkably rare. It is not improbable that some of the changes observed as a consequence of internal carditis, and of chronic inflammation of the large vessels, would be detected in some cases if a careful inspection after death were instituted in persons who had been subject to this complaint. A plethoric state of the vascular system generally has been remarked by WINNEKE, and a very dark and altered state of the *blood* by THILENIUS and BURGGRAU. Various lesions have been found in the *brain* and its *membranes*, particularly in cases wherein the patient's chief suffering had been referred to the head; but these lesions have either been very different in different cases, or very imperfectly described; while, in some, little or no alteration has been detected. In short, the bodies of hypochondriacs have presented lesions as diversified as the complaints made during life; but these lesions have been very frequently overlooked, or no inquiry after them has been made, owing to the circumstance of the complaints of this class of patients having been very generally viewed as entirely imaginative.

15. V. DIAGNOSIS.—The diagnosis of hypochondriasis is most difficult; for the complaints of the patient are so distressing, and his sufferings apparently so extreme, that the inexperienced practitioner may be deceived by them, and believe them to proceed from dangerous states of disease, and to require the most energetic remedies. This simulation of organic and serious maladies, if it be not detected, may lead to a mischievous treatment. On the other hand, when a patient is known to be the subject of hypochondriasis, the circumstance ought not to induce us to overlook, or to treat carelessly, his sufferings, which are generally not only real, but also often depending upon structural changes, although these changes are either too obscure or too minute to be readily or easily detected. The versatility and mutations of the hypochondriac's sufferings, and the inconsistency observable between his complaints and his appearance, and between the local and general, or constitutional symptoms, will readily suggest the nature of the disease. Yet the symptoms sometimes continue without change; and the patient often makes the same complaint. In such cases, there is reason to believe that real disease exists, although exaggerated by his morbid sensibility and fears, by his imagination having long been engaged with his sensations in the seat of disorder. The want of relation between his feelings and constitutional symptoms ought, also, not to be too much relied upon; for, in hypochondriacs, the vascular system is not readily excited to febrile commotion, although the sensibility is easily deranged and altered in a variety of situations, either successively or simultaneously. In every instance there is the utmost necessity for patient investigation, and for the exertion of practical acumen. When the hypochondriac's sufferings are seated in the digestive organs, then a careful examination of the abdominal regions, and of the excretions, will generally indicate the extent of mischief, and show how much may be attributed to the patient's susceptibility or morbid sensibility; but when the complaints are referred to the head or heart, then the difficulty is greater; for we know that in these situations structural changes may be slowly advancing without inducing those physical signs and disorders of the functions of these organs usually attendant upon more rapidly developed organic lesions.

16. The sufferings referred to the *digestive organs* have been imputed by BROUSSAIS and his followers to *gastro-enteritis*; and I believe that, in many cases, the circulation in the digestive mucous surface is more or less deranged; but this derangement is not identical with true inflammatory action. The organic sensibility and state of nervous influence in these parts are not the same in these complaints. In hypochondriasis the patient can bear firm and prolonged pressure, although he may wince from a momentary or slight pressure, owing to his fears and morbid feelings. He generally has an unimpaired, or even a ravenous appetite; is capable of using exercise, or even of undergoing fatigue, and is benefited by them. His bowels are usually costive, and his appearance is not materially, if at all, affected; and febrile symptoms are not observed. Whereas, in gastro-enteritis, firm pressure is generally not endured, the appetite is impaired, as well as the looks, strength, flesh, and general health; and the bowels are loose and irritable, although the converse of this is sometimes observed. The spongy condition of the gums, the falling of them from the teeth, and the flabby state of the sides of the tongue, frequently observed in hypochondriasis, indicate rather a deficiency of tone and of vital cohesion of the digestive mucous surface than inflammatory action.

17. The symptoms referrible to the *head* are often such as to rouse the anxiety of the practitioner, especially when they are attended by disorder of any of the functions of sense. Yet I believe that these symptoms more frequently depend upon disordered circulation, as well as altered sensibility, than is supposed. In this complaint the state of the cerebral circulation is too often neglected, or not inquired into, and the sufferings of the patient believed to be either exaggerated or imagined. When his strength and healthy appearance are unimpaired, and the functions of the senses are uninjured; and when the temperature of the scalp and the action of the carotids are not materially affected, we may safely conclude that the morbid feelings in the head do not indicate that danger which the fears of the patient would imply; and this inference will be the more conclusive if the patient have never experienced any apoplectic, paralytic, or epileptic seizure, and if he has been known to be subject to nervousness, low spirits, or hypochondriacal feelings. In many cases, however, of this malady, particularly in the second or third grades of it,

increased action of the carotids, heat of the scalp, flushing of the countenance, suffusion of the eyes, &c., indicate cerebral plethora, or active congestion within the head, and sufficiently show that, although the sensations in this quarter may be exaggerated, they are by no means unreal.

18. The disorders referred to the *heart* and *lungs* are to be distinguished from such as are unequivocally organic by attention to the physical signs. The palpitations and anxiety at the præcordia often complained of are certainly chiefly nervous in their nature; but of this we have only negative proof. During the palpitation, a bellows-sound may be present, although it cannot be detected in the intervals. Yet I have known instances where it was at first heard only during the paroxysm of palpitation; but, after the lapse of a long period, it was heard more constantly. I believe that those distressing symptoms, although strictly nervous at early periods of the disease, either slowly or imperceptibly induce, or are attended from the beginning with a slight and gradually increasing kind of organic lesion. Morbid states of the heart, as slow grades of inflammatory irritation, may exist, especially in the lining membrane of the cavities and large vessels, and occasion the distressing feelings complained of, although they may not be manifested by physical signs. When cough and difficult or oppressed breathing are present, their nervous or sympathetic nature may be readily determined by attention to their characters, by the absence or the appearance of expectoration, and by the signs furnished by auscultation and percussion.

19. Hypochondriasis has been often confounded with, or viewed as a variety of *insanity*. It is important to discriminate between them. Dr. Prichard's remarks on this subject evince the correct judgment of this able writer. He observes that a hypochondriac is in full possession of his reason, though his sufferings are not so dangerous or so severe as he supposes them to be; but if he declares that his head or his nose has become too large to pass through a doorway, or displays any other hallucination, he has become a lunatic; his disorder has changed its nature; and this conversion takes place occasionally, though by no means so frequently as supposed. Hypochondriacs, however low-spirited or dejected, also suffer differently from persons affected with *melancholy*. The apprehensions of the former are confined to their own feelings and bodily health. On other subjects they converse cheerfully, rationally, and justly. But melancholics view all things through a gloomy medium. They despond on all subjects, and are mentally miserable, and independently of any severe bodily suffering. The affections and sentiments of the hypochondriac, especially to his former friends, or to his connexions, are not in the unnatural or perverted state observed in all the forms of insanity.

20. VI. Causes.—i. *Predisposing circumstances*.—Hypochondriasis may commence at any age; from 21 to 55 in males, and from 30 to 60 in females. It is more frequent and more severe in the former than in the latter sex. It seldom occurs in females until after 30 or 35, hysteria being the form which nervous affections usually assume in them in early life; but it often commences about or soon after the cessation of the menstrual discharge, although rarely in so severe a form as in the other sex. It affects every temperament or habit of body; but somewhat oftener the nervous, the melancholic, the sanguine, and the bilious; and persons who are subject to hæmorrhoids, to constipation of the bowels, and to disorder of the digestive functions, and who are of a sallow complexion. Hereditary influence, or peculiarity of constitution transmitted from the parents, has, perhaps, some influence in predisposing to it, as Willis, Hoffmann, and others have contended, although not in so remarkable a manner as in some other nervous complaints. Employments which are sedentary, or prevent due exercise in the open air, and which, at the same time, admit of activity of mind, also predispose to this complaint. Hence the frequency of hypochondriasis in shoemakers and tailors. Mental exertion and fatigue, or prolonged or overstrained attention and devotion to a particular subject, especially in connexion with full living relatively to the exercise taken in the open air, may be said to be the chief sources of predisposition among the educated classes.* Owing to these circumstances, this has been termed the disorder of literary men; but whoever is engaged in active mental pursuits, or in departments of business requiring great intellectual exertion, or occasioning anxiety of mind, is equally liable to it. Dr. Prichard observes that agricultural labourers, who spend a great portion of their time in solitary employment in the country, are frequently the subjects of this complaint. Although solitary employment is likely to dispose the mind to brood over the evils that afflict it, yet much is probably, also, owing to the diet of field labourers, and to the influence of humidity and exhalations from the soil to which they are exposed, particularly in the reparation of ditches and hedges. The effect of climate in predisposing to hypochondriasis is not very manifest; but situations which are humid, and productive of terrestrial emanations, are apparently not without some influence in the production of it.

21. ii. The *exciting causes* may be divided into (*a*) those which act more immediately upon the mind, and consecutively, or through the medium of the mind, upon the organic functions; and (*b*) those which affect primarily those functions, and secondarily the mental energies.—*a*. Whatever exhausts or directly depresses cerebral power, as intense application of the mind to difficult or abstract subjects, anxieties respecting schemes, speculations, or objects of ambition; disappointments, sorrow, fright, or sudden alarm; the depressing passions, severe losses of fortune or friends, indulgence of sombre or sad feelings; devotion to music and the fine arts, reading medical books, &c., and whatever favours congestion

* [We are acquainted with several clergymen labouring under the most aggravated form of this disease, brought on by high living, close application, and want of bodily exercise. They have tried every form of quackery, including hydropathy and homœopathy, under a mistaken impression that their complaint is under the control of drugs. Few, if any of them, have ever been induced to pursue a systematic course of exercise, with early rising, cold sponging, and a regulated diet; means which would undoubtedly suffice, in nine cases out of ten, to remove every vestige of the malady.]

of the brain, as indulgences in bed, the use of narcotics, particularly opium, &c., may occasion this complaint.

22. *b.* The causes which act primarily upon the organic nervous system and functions of the organic viscera are very diversified. Whatever impairs the energy of the system, as the too frequent or too liberal use of calomel as a purgative, or of other mercurials; poor or innutritious diet, or the excessive use of tea and slops; a humid, close, impure, or miasmatous air, &c., may produce hypochondriasis. Mercurial purgatives, although often serviceable by promoting the discharge of bile, and giving relief for a time, yet often increase the nervous depression and morbid sensibility, when frequently resorted to, and induce or aggravate this complaint. Of the origin of hypochondriasis in an improper recourse to calomel, I have seen several instances. Whatever inordinately excites or directly relaxes the digestive mucous surface, as acrid cathartics, often exhibited, &c.; whatever occasions or perpetuates indigestion, or impedes the functions of secretion and excretion; and whatever occasions plethora of the vascular system generally, or of the portal or cerebral vessels in particular, especially overloading the digestive organs by too large meals, or by too rich or full living, the inordinate use of animal food, of malt liquors, wine, &c.; insufficient exercise, and inattention to the several excreting functions, may give rise to hypochondriasis. Whatever induces torpor or perpetuates inaction of the depurating organs, while the organs of supply are stimulated to increased activity, will occasion redundancy of noxious elements, or of the ultimate products of animalization in the blood, and will, sooner or later, especially in connexion with vascular plethora, give rise to this complaint, or to some other, depending, equally with it, upon oppletion of the vascular system. Persons who have been accustomed to active occupation, both physical and mental, or to much exercise in the open air, upon retiring from business with a competency, and when hoping to enjoy the fruits of industry, are often overtaken by this complaint, particularly if they live fully, and in a comparative state of ease and indolence. The vascular system, which was formerly preserved in a state of fulness, in due relation to nervous power, by the healthy action of the different emunctories, now becomes overloaded, particularly the portal vessels. The cerebral circulation also becomes oppressed, and the mental energy impaired.

23. *c.* Some of the causes act by weakening both the organic nervous influence and the mind. The most injurious of these are premature and excessive sexual indulgences, particularly masturbation. Whenever hypochondriasis appears early in life, this should be dreaded as having been the chief cause. Many of the depressing passions, and anxiety of mind, act in a smilar manner. As the early addiction to vicious habits, as well as several others of the exciting causes, is more or less frequent in all classes of the community, it cannot be said that the effect is confined to any particular class. Indeed, hypochondriasis is often met with in the lower orders, although not so frequently as in those whose minds are most highly cultivated, whose sensibilities are thereby rendered acute, and who are either precluded from, or not obliged to take that exercise which is necessary to prevent general, local, or excrementitious plethora.

24. VII. PATHOLOGY.—The ancients appear to have observed this complaint chiefly among philosophers, poets, and others endowed with the most acute sensibility and the most vivid imagination, and to have either confounded it with, or viewed it as a variety of melancholy. ARISTOTLE says that all the great men of his time were melancholic, that is, hypochondriac. HIPPOCRATES, ARETÆUS, and others attribute the complaint to an excess of black bile. DIOCLES refers it to the stomach, and GALEN considers it as a variety of melancholy, having its origin in this organ. However much the ancients and older writers differ as to whether it should be considered as a dyspeptic or as a mental affection, they appear not to view it as connected with hysteria. SYDENHAM, however, describes hypochondriasis and hysteria as the same affection, without taking into account the chronic inflammations, obstructions, or lesions of structure so often associated with the former, and refers them to deficiency or irregularity of the animal spirits—of the cerebro-spinal nervous influence, in the language of modern pathology. WILLIS considers it as a nervous complaint seated in the brain; and ZACUTUS LUSITANUS, as an affection of the stomach and liver, depending upon coldness of the former and increased heat of the latter. BOERHAAVE thinks that it depends upon a viscid matter engorging the vessels of the organs seated in the hypochondria, as the liver, the spleen, stomach, pancreas, and the mesentery. STAHL and his followers suppose it to arise from efforts to establish a critical hæmorrhage; LOWER, from a morbid disposition in the mass of blood; and HOFFMANN, from too great a tension of the nervous system, sometimes in connection with inflammation of the digestive mucous membrane. From the time of HOFFMANN until that of CULLEN, various modifications and absurd combinations of the preceding opinions have been advanced. CULLEN observes that this disorder occurs chiefly in persons of a melancholic temperament; that it consists of an affection of the mind, conjoined with dyspepsia, and is the result of a weak and mobile state of the nervous power. The opinions of CRICHTON and GOOD are deficient in precision and accuracy; they have confounded with hypochondriasis affections entirely distinct from it and from one another. LOUYER-VILLERMAY has formed more correct views of its nature and relations than most modern authors. He concludes that it is seated in the abdominal viscera, particularly in the stomach, and that these are affected in their nervous system or their vital properties, and especially in their organic sensibility. He conceives the disorder to consist in an alteration of the vital properties of the nerves of digestion, and an exalted state of organic sensibility, of which these nerves are the special conductors and receptacles. At the same time, he admits that the general sensibility and the cerebral functions become consecutively affected. This opinion is essentially the same as that of BICHAT; and it has been adopted by the author, and, more recently, by M.

Brachet and Dr. Gully. M. Broussais contends that hypochondriasis is not merely a nervous affection, but that it is a result of chronic inflammation of the digestive mucous membrane, the morbid sensibility distinguishing it arising from the peculiar condition of this membrane, as respects its vascularity; and that the various ailments of which the hypochondriac complains proceed from sympathy with this part of the digestive canal.

25. M. Georget argues, on the contrary, that the disease is primarily seated in the brain; that it is characterized by disorder of the functions of this part, unaccompanied by fever, or convulsive motion, or any manifest derangement of reason or judgment; and he adduces the following circumstances in support of his argument: 1. That the chief exciting causes of the disease exert their influence directly on the functions of the brain. 2. That the characteristic symptoms are referrible to the head. 3. That other symptoms observed in the complaint are not constant, some belonging to one organ and others to another, while the digestive functions are occasionally not disordered. 4. That moral treatment is the most efficacious in the complaint. There are several fallacies in the above inferences; it by no means follows that, because certain occurrences make their first impression on the mind, the brain should be either principally or primarily affected by them. The depressing passions, however excited, produce a much more remarkable effect upon the functions, and even upon the organization of the heart, the stomach, the liver, &c., than upon the brain itself, unless, indeed, this last organ has previously been in a state of disease. The early symptoms, also, of hypochondriasis are certainly not so referrible to the brain as to the digestive and other organs supplied by the ganglial class of nerves; and moral treatment is not always the most successful, or that which should be alone put in practice; it more generally constitutes only a part of a general plan.

26. Dr. Prichard observes that, when we take into consideration the mental dejection of hypochondriacs, the habitual state of their spirits, and the trains of morbid or painful sensations which torment them, we must admit that some deviation from the healthy state of the cerebral functions lies at the foundation of their ailments, though it is remote from organic disease, and of a kind of which we can form no conception. Many of the phenomena, he allows, would lead to the opinion that the principal deviation from the natural state of functions is seated in the nervous system of physical or organic life; but phenomena involving consciousness and affections of mind can hardly be confined to this part of the nervous system. Dr. Prichard, however, overlooks the fact that the brain itself is as much supplied with the organic nervous system as any other internal organ, and, consequently, that it will manifest disorder whenever this part of the nervous system is seriously affected; and that this disorder will present similar characters as to kind—as to depression, perversion, activity, or exaltation—to those displayed by other organs influenced by this system. The complaint, it is admitted, commences, or is first manifested in the digestive viscera; and it is not until the organic nervous system evinces great depression throughout the abdominal organs that the functions of the brain become also manifestly depressed or impaired, and then the depression observed in the energies of these functions is similar in kind to that remarked in the digestive, secreting, and excreting actions: these latter are performed slowly and imperfectly; intellectual power, attention, and application are also weakened. The sensibility of the organic nervous system is morbidly acute in all or several of the viscera; the cerebro-spinal system, and the dependant organs of sense and volition, are also morbidly susceptible, and incapable of the energetic exercise of their functions. The organic actions are performed with obscure sensations of distress, difficulty, or anxiety; the mental operations are attended by fear, distrust, and anxious bodings. The vital manifestations throughout the economy are languid and relaxed, and the resistance opposed by life to morbid impressions remarkably weakened; the faculties of the mind are equally languid, and the tone of the cerebro-spinal nervous system altogether depressed. Dr. Prichard supposes that the occasional suspension of the complaint, for longer or shorter intervals of time, militates against the opinion that the disease is owing to the state of the organic, nervous, and digestive functions; but this part of the nervous system is as likely to experience remissions and exacerbations of disorder as the brain and its dependencies. At the commencement, the affection of the organic or ganglial nervous system is confined chiefly to the digestive and excreting organs; but at a more advanced stage it is extended to the brain, where it occasions the dejection of spirits, the fears, and the anxieties connected with the patient's feelings and ailments, characterizing the fully-developed complaint.

27. My views will be partly apparent from what has been now advanced. But, although the organic nervous system is evidently primarily and chiefly affected in hypochondriasis, and although the brain thus becomes consecutively implicated, other morbid conditions are also superinduced, and are more or less concerned in the aggravation or perpetuation of the patient's feelings and sufferings. Imperfect excretion, compared with the supply of nourishment, induces either absolute or relative plethora, as well as a morbid condition of the circulating fluids, owing to the accumulation of noxious matters—alimentary, saline, and animal—products of animalization which have not been eliminated from the blood. The chief vital organs thus become loaded and oppressed; and the nervous system and brain are rendered morbidly susceptible by the quality of the blood circulating in them. From considerable experience and close observation of the circumstances connected with the pathology and treatment of this complaint, I am firmly persuaded that these views constitute the only basis of a successful method of cure.

28. VIII. Prognosis.—It is often extremely difficult to form an opinion as to the presence of danger in this complaint. Even where the sufferings have been most distressing, the patient's life has apparently not been materially shortened thereby; and where they have been much slighter, death has occurred unexpected-

ly, and while the symptoms did not seem to indicate its approach. This may have been owing in part to the want of discrimination on the part of the practitioner, in not detecting organic lesion in the heart, brain, or other viscera. There can be no doubt that many cases of obscure structural change in either of these organs, or in any other part, were formerly considered as hypochondriasis, and most injudiciously treated as such. Many of these would have been detected by the improved diagnosis of the present day, and thus the number of instances of the disease would have been diminished. Yet, nevertheless, the existence of this complaint, or, in other words, of an affection of the functions and sensibility of the organic and cerebro-spinal nervous systems, sometimes associated with and heightened by structural lesions, cannot be doubted; although M. Foville has contended that it should not be considered as anything else than organic change in persons of acute sensibility; that both it, hysteria, irregular gout, and disorders of the fluids belong to the same category; and that to one or other of these the ignorant part of the profession refer those complaints, the true seats and nature of which they are unable to detect; that, in short, they are names under which all others but the morbid anatomists conceal their ignorance. Now it may be stated, without much fear of injustice, that those who see nothing in disease but what is demonstrable after death, and who believe in nothing pathological which is not material and palpable, will very often arrive at wrong conclusions as to the origin, nature, course, and treatment of the most important maladies of our species.

29. The *Prognosis*, however, relates more to the probable recovery of the patient than to any danger more or less immediately attending it. Of the existence of danger, the signs of organic change will be the chief harbingers, and upon the detection of these, and upon the inferences formed as to the seat and nature of existing lesion, the opinion will necessarily depend.—*a*. The circumstances which may be considered as *unfavourable* to the patient's complete recovery are not always very manifest or readily ascertained; but, if the causes are not removable, or chiefly of a moral kind; if the disease is confirmed, or if the patient has had repeated attacks; if it has supervened upon the suppression of the hæmorrhoidal flux, and is not removed by the restoration of this evacuation, or upon the disappearance of the catamenia at the usual period; if sleep is not obtained without recourse to narcotics; if the imagination is powerfully affected, and constantly influenced by moral causes, the physical indications of disease being slight; if the nervous affection is associated with serious disorder, or with signs of structural change of some important viscus or with some mental delusion; and if the patient indicates much suffering in his appearance, or the melancholic temperament, or a cachectic habit of body, we may expect to alleviate, but we can hardly hope to remove the malady, although the removal of it may be accomplished.

b. A more favourable opinion may be entertained if the chief ascertained causes are removable; if the disease is recent, or only in the first or second stage; if the patient is of a sanguine temperament; if the circumstances or profession of the patient admit of exercise, or salutary employment of mind or body, and of travelling, or repeated change of air during the treatment; if he enjoys his nightly repose, and possesses his usual or natural looks; if the test of Baglivi—"In chronicis morbis si facies naturalis sit, ac boni coloris, nunquam crede adesse obstructiones, aliaque vitia in visceribus"—is applicable, and if the unfavourable circumstances enumerated above are not present. Hypochondriasis has been removed by the supervention of other diseases, as diarrhœa, dysentery, fever, jaundice, dropsy, &c.

30. IX. Treatment.—Hypochondriasis would be more frequently cured if stricter attention were paid to the removal of the circumstances in which it originated, and to the combination of physical and moral treatment appropriately to the pathological states just considered. But the disease is generally advanced or confirmed before proper medical advice is resorted to; the patient has been for some time exciting his imagination and aggravating his morbid sensations by reading medical works, which might mystify, but could not instruct him as to his ailments, and dabbling in physic, which might confirm, but could rarely relieve his complaints; he fails in his own efforts, and then, if he have recourse to a duly qualified adviser, he expects, and is impatient if he does not derive immediate benefit. Many hypochondriacs also adopt neither the restricted diet nor the regimen prescribed for them; and thus the treatment fails more from the fault of the patient than from the means employed.

31. i. *The first indication*, in the treatment of hypochondriasis, is *to remove the remote causes, the habits, circumstances, and moral influences to which the patient has been or is subjected*. The *diet* should be restricted, and regulated with reference to the patient's habits, occupations, and daily amount of exercise; and he ought to be engaged, as much as possible, with objects calculated to interest, but not to fatigue the mind. With the affluent this is a matter of difficulty, and is often only to be accomplished by travelling. In the good old monkish days, pilgrimages to the shrines of saints were recommended for the benefit both of soul and body; but in modern times, since these have become divided cures, saintly interference has been but little confided in, and the purifying operation of mineral springs has alone been considered efficacious. And certainly the good effects resulting from faith in either, or in both these agents, have neither been few nor equivocal. The shrewd practitioner who plants himself by the side of a saline or chalybeate mineral spring, or any other spring possessing deobstruent and tonic properties, and situated in a dry and salubrious air, if he succeed in attracting hypochondriacs to his Hygeian temple by the usual direct or indirect means, will generally relieve many of the more faithful of his worshippers. The lawyer, the merchant, the stock-broker, and others who have weakened their digestive organs, exhausted their nervous systems, and over-excited or tortured their brains by application to business, by the vicissitudes of affairs, and the anxieties which are consequent thereon, when induced to visit a watering-place, will frequently derive benefit from the moral

and physical changes thereby occasioned. Instead of over-exciting or distracting the mind with business, of overloading, and, perhaps, over-stimulating the digestive organs, of allowing the liver and bowels to become torpid, of neglecting due exercise in the open air, and of respiring the impure atmosphere of a crowded city or manufacturing town, the hypochondriac is properly directed to relinquish the anxieties of affairs, to conform to a limited diet, to keep his bowels very freely open, to walk and ride a certain number of miles daily at prescribed times, and to drink the waters, whether aperient, deobstruent, or chalybeate. The result cannot be doubtful in many cases. The entire removal of the causes of disorder, the exercise, the change to a purer air—the thorough alteration of habits, of circumstances, and of atmosphere—all combine to produce benefit; and the physician, as well as the spring, obtains a credit, to which the amount of merit really possessed by either by no means entitles them, and which is often heightened by the circumstance of advice previously given to the patient—while he is immersed in business and distracted by anxieties, when precluded from exercise and amusement, and when constantly subjected to the combined operation of the causes of the malady—having failed in accomplishing what was probably most judiciously attempted, but which he was counteracting in the most efficient manner in his power.

32. The best means of fulfilling this indication is by *travelling*, and by due *attention to the diet, and to the excreting functions*. Continued residence at a single watering-place is not nearly so beneficial as travelling, unless much exercise be daily taken. Travelling, aided by mineral waters suited to the peculiarities of the case, has the best effect; and, next to this plan, judicious medical treatment, pursued at the same time with change of air and scene. The very incidents connected with travelling, as Dr. PRICHARD remarks, abstract the patient's attention from his feelings and sufferings; and even the temporary disorders that may occur, as rheumatism, cold, and diarrhœa, produce this effect in a still more remarkable manner. When mineral waters are resorted to, either alone or in connexion with travelling, those which are aperient and deobstruent should be first used, as the waters of *Seidschutz*, or *Pullna*, or *Cheltenham*, or *Harrowgate* [or the *Congress* at Saratoga], &c.; and subsequently those of *Bath, Carlsbad*, or *Marienbad, Pyrmont*, or *Tunbridge*, &c. The springs of *Schwalbach* and *Pyrmont* were much extolled by HOFFMANN; those of *Eger* and *Marienbad*, by HEISTER and HUFELAND; and the waters of *Pyrmont* and *Seltzer*, by MARCARD. The baths of *Wiesbaden* have also been praised by RITTER and others. During a course of chalybeate waters [as the *Pavilion, High Rock*, or *Iodine* at Saratoga], the bowels ought to be kept moderately open, either by aperient medicines, or by the more aperient or purgative waters. Exercise of all kinds is more or less beneficial; but that on horseback, or on foot, or both, is perhaps preferable. The former was much praised by SYDENHAM and FULLER; but, whatever kind of exercise be adopted, it is necessary to regulate the bowels, to promote the functions of the emunctories, to remove the patient from the pursuits, anxieties, and circumstances which induced the complaint, or to change his habits, and to amuse and interest his mind.

33. ii. *The second indication is to evacuate morbid secretions and accumulated excretions, to correct the morbid states of the digestive canal, and of the organs immediately connected with it, and to relieve the more distressing feelings of the patient.* It is indispensable to the obtaining of the confidence of the patient, and, consequently, to the successful management of his case, that his various ailments should be attentively heard and patiently investigated; that they should be altogether viewed as real, and that the treatment should be prescribed for him with clearness and with decision. However much the practitioner may doubt as to the origin or nature of the complaint, and however much he may despair of the efficacy of the means prescribed, he should conceal his doubts, treat the sufferings and feelings of the patient with sympathy, and arrange and combine the means of cure into a method at once consistent and appropriate, which is to be faithfully pursued in all its parts. Confidence will be thus inspired, without which he will neither derive benefit nor continue under treatment.

34. *a.* The propriety of having recourse to *mild* or *stomachic* purgatives, when the bowels are sluggish or torpid, or the stools offensive, cannot be questioned. Yet, in some cases, the *gastro-intestinal mucous surface* may be in such a state of irritation or of chronic inflammation as to require these to be prescribed with caution and selected with judgment. When this state of the digestive mucous surface is present, *leeches* should be applied to the abdomen, or to the anus; *refrigerants* should also be given with *mucilaginous* or *emollient medicines* (F. 355, 431, 436, 821, 837, 865), and the functions of the skin promoted by the *warm* or *vapour bath*. If the patient be plethoric, a moderate *venæsection* or *cupping* on the nape of the neck, or a repetition of leeches to the epigastrium or anus, will be of service. Although irritating purgatives are hurtful in this description of cases, yet those of a mild or of a cooling kind ought not to be withheld; and their operation may be promoted by enemata. The tartrate or sulphate of potash, the carbonate of soda or magnesia with rhubarb, either in powder or infusion; or the phosphate of soda, or the tartrate of potash and soda, may be given with other substances (F. 440, 441, 868), according to the peculiarities of the case. The *diet* should be restricted chiefly to mucilaginous or farinaceous articles, and the beverages consist of simple saline or cooling fluids.

35. In other cases, particularly where the digestive mucous surface is deficient in tone, and when the states of the epigastrium, of the pulse, and of the tongue do not indicate inflammatory irritation, *purgatives* or *aperients* of a warmer or more stomachic kind than the above may be prescribed. The infusion of senna, or that of rhubarb, may be given with the infusion of gentian or of columba, or of cinchona, or of cascarilla, and an aromatic or carminative tincture and a neutral salt; or the aperients directed above (§ 34) may be taken in mint-water. In many cases the compound *galbanum pill*, or *asafœtida*, may be conjoined with the purified *extract of aloes*, or with *rhubarb*, and the inspissa-

ted *ox-gall* (see F. 547, 548, 558–563, 572–576), either at night, or daily with dinner. I have found the following excellent in hypochondriasis with a torpid state of the large bowels :

No. 259. R Pulv. Rhei ʒss.; Pulv. Ipecacuanhæ, Pulv. Capsici, āā gr. vj.; Extr. Aloes purif. ℈j.; Extr. Fellis Tauri ʒss.; Saponis duri, gr. xij.; Olei Carui, q. s. Contunde benè, et divide in Pilulas xxx., quarum capiat unam vel duas quotidiè cum prandio.

No. 260. R Extr. Fellis Tauri, Massæ Pilul. Galb. Comp., āā ʒss.; Extr. Aloes purif. ℈j.; Saponis duri, gr. x.; Pulv. Ipecacuanhæ, gr. viij. M. Fiant Pilulæ xxx., Capiat unam vel duas, ut suprà.

36. The use of *laxatives* in hypochondriasis was much insisted on by RENOUART and LEGIER, and various substances belonging to this class were recommended; but they require no very particular remark at this place. *Magnesia*, especially the calcined, is well deserving of adoption when the complaint is attended by a copious deposite of salts in the urine, or by a gouty diathesis. It also relieves the flatulence and distention of the epigastrium and hypochondria more certainly than any other aperient. When there is no gastro-intestinal irritation, or if this be slight only, it may be given in mint-water, or in any tonic, stomachic, or aromatic vehicle. Precipitated *sulphur* was much praised by BISSET, and is certainly an appropriate laxative, particularly as the use of it for some time increases all the excretions, and especially those from the skin, bowels, and liver.

37. *b.* Many of the distressing feelings of the patient are referrible to *irritation* in some part of the digestive mucous membrane. This irritation may exist in the *rectum* in connexion with hæmorrhoids, or in the *cæcum*, or in any other part of the canal; but these two are among its most common seats. In such cases it is propagated by the communicating ramifications of the ganglial nerves to the roots of the spinal nerves, or to the spinal chord, and sensibly expressed in some remote part by *reflex sympathy*, as stated in my notes to RICHERAND'S *Elements of Physiology* (p. 34, London, 1824, 2d ed., 1829). The *hæmorrhoidal discharge* has been considered favourable in hypochondriasis by ALBERTI, GRANT, and others; but, as already stated (§ 6), it indicates either general or local plethora, when it has not been induced by costiveness or by acrid purgatives, and points to restricted diet. When the hæmorrhoids are not attended by any discharge, they furnish the same indications, and show that, in addition to low diet, general or local blood-letting should be prescribed. Without these, the removal of the hæmorrhoidal affection may not be entirely devoid of risk to the hypochondriac, especially if regular exercise in the open air be not taken.

38. *c.* Simple *lavements* or *enemata* have been too generally neglected in the treatment of this complaint. The researches of PINEL, ANNESLEY, and of the author, show that the large bowels are not only disordered in their functions, but also often altered in structure, or even displaced in the more severe and chronic cases. The depressed state of organic nervous energy, occasioning hypochondriasis, permits fæcal and flatulent accumulations to form in the *cæcum*, *colon*, and *rectum* (see these *articles*), causing inordinate distentions of portions of the canal with spasmodic constriction of adjoining parts. Owing to the fæcal collections, to the efforts of one part of the bowel to propel its contents through a torpid or an obstructed portion, and to the frequent recurrence of these states, displacement of portions of the colon, and even partially of the cæcum, are not rare. Inordinate dilatation of the latter viscus is also sometimes observed. But I have remarked, in several cases of hypochondriasis complicated with hæmorrhoids, or with spasmodic stricture of the sphincter ani, or with fissure or some other source of irritation in the anus, a remarkable *dilatation of the rectum* within the sphincter. In these instances the dilatation amounted to a sacculated state. This had evidently proceeded from inordinate accumulation of fæces, owing to the obstacle to their discharge, caused by internal hæmorrhoids or by spasm of the sphincter. One of these had been treated for stricture of the rectum, and a bougie frequently passed; but it seldom found its way into the portion of the bowel above the dilatation. The intestine was injured by this officious interference; peritonitis supervened; and near the fatal termination of the case I was consulted. Inspection after death furnished a striking example of this dilated state of the rectum, as well as of the effects of a species of interference generally quite unnecessary, although so frequently practised at the present day by a few surgeons, as to render it disgusting, particularly as it is warranted neither by the history and nature of the case nor by sound therapeutical views.

39. In the early stages of hypochondriasis, especially, and as a means of preventing costiveness and the above, as well as other consequences of this state, *enemata* of various kinds, according to the peculiarities of the case, ought to be frequently employed. Simple water, tepid or cold, emollient, oleaginous, or saponaceous fluids, and various saline solutions, will be thus administered with benefit, and will not only promote the action of the aperients just mentioned, but, when daily used, will establish a regular state of fæcal excretion. (See *the Formulæ for Enemata in the Appendix.*)

40. *d.* Whenever the complaint is connected with vascular *plethora*, or is consequent upon the suppression or disappearance of some accustomed evacuation, and when it has been fully developed, an oppressed or *congested state of brain* may exist. But whatever may be the state of circulation in the capillaries or sinuses of this organ, there can be no doubt of the propriety of a moderate *depletion*, by cupping on the nape of the neck, in these cases. I have prescribed it in several instances with marked benefit, and in one gentleman I carried the depletion to thirty ounces at a single operation with the greatest advantage. Many of the patient's distressing feelings depend upon the superinduced disorder of the circulation in the brain, particularly those which are referred to the head, and to the organs of sense and volition. In some cases, however, of this description, blood should be abstracted with caution, and it will sometimes be necessary to promote nervous energy and tone, even while we have recourse to depletions and evacuations. Whenever the hypochondriac has increased heat of scalp with a firm pulse, these latter may be safely prescribed in moderation, and may be aided by cold-sponging the head night and morning, or by daily recourse to the *cold douche* or

shower-bath. The extremities, especially the feet, of this class of patients are generally cold; this circumstance should receive due attention. When the sufferings are referrible to the brain it will be useless, and indeed sometimes injurious, to attempt to alleviate or suppress them by powerful narcotics. Even when these give temporary relief, more permanent mischief is often occasioned. The means already noticed, both regimenal and medicinal, will be much more efficacious; and, if these fail, when pushed sufficiently far, organic lesions probably exist, for which setons, issues, &c., may be tried, although with but slight prospect of advantage.

41. *c.* If the complaint is associated with *palpitations* or *irregular action of the heart*, or with a *dry, nervous cough*, much benefit will result from *camphor*, conjoined with *narcotics*, and sometimes, also, with *refrigerants* and *demulcents*. A weak decoction of *Senega*, with orange flower water, or with any other aromatic and demulcent fluid, and with small doses of *prussic acid*, or of some other anodyne, will often, also, be of service. If the *liver* be congested or otherwise disordered, the treatment should be modified accordingly. The majority of cases of this kind, particularly if the patient have lived fully or taken little exercise, will bear *depletion*, especially cupping on the right hypochondrium, or below the right shoulder, or the application of leeches to the anus. A dose of *calomel*, or of PLUMMER'S pill, or of blue pill, may also be prescribed; but it should either be conjoined with an aromatic, or some purgative, or be followed, in a few hours, by a stomachic aperient. Hypochondriacs are generally very susceptible of the specific action of mercurials, and their mental depression and nervous sensibility are much increased by them; yet, with due caution, and if not often resorted to, they are beneficial when the functions of the liver are impaired. The super-tartrate of potash, the preparation of *taraxacum*, and the carbonates of the *alkalies*, with stomachic purgatives, are also of great service in a torpid state of this organ. When, in connexion with this, or with a morbid state of the biliary and other abdominal secretions, the hypochondriac complains much of *colicky pains*, with costiveness, flatulence, distention, &c., these, and the mild purgatives already mentioned, calcined *magnesia*, with antispasmodics or carminatives, or with small doses of *ipecacuanha* and *hyoscyamus*, should be steadily employed for some time, and be aided by emollient diluents, by *demulcents*, and by *saponaceous* or *oleaginous enemata*. Castile soap may also be conjoined with the other substances, given in the form of pill.

42. iii. *The third intention is to restore the energy and healthy functions of the organic, nervous, and cerebral organs.*—*Tonics* have been too commonly prescribed prematurely in hypochondriasis, or when the digestive mucous surface, or the brain, or the liver, has not been in a state to derive benefit from them. They are even prejudicial in most of the circumstances which have now been considered, unless in combination with purgatives, especially when these parts are in a state of irritation or congestion, and, until this be removed, they may even aggravate the complaint. But when the excretions have been duly promoted, appropriate evacuations procured, and visceral congestion removed, a judicious recourse to them is often of great service. During a course of tonics, the bowels should be kept regularly open, and local irritation or determination of blood prevented or removed, should either appear. The *chalybeate mineral springs*, already mentioned (§ 32), are especially beneficial when tonics are indicated. The preparations of *iron*, particularly the sulphate, the ammonio-chloride, the potassio-tartrate, and the sesqui-oxyde, may be substituted with advantage for mineral waters; but if they occasion fever or headache, they will generally be injurious, unless conjoined with saline refrigerants. If *gastrodynia* is complained of, the tonics may be given with anodynes or narcotics, as the *hydrocyanic acid*, *hyoscyamus*, the compound *tincture of camphor*, &c., or with the carbonates of the *alkalies*; the *tri-nitrate of bismuth* may be prescribed in similar combinations. Where there is a tendency to plethora, tonics, and especially chalybeates, should not be employed without attention be paid to exercise and diet. When tonics prove too heating, the bitter infusions or decoctions may be prescribed, with small doses of *nitre* or of the *hydrochlorate of ammonia*.

43. When hypochondriasis seems consequent upon venereal excesses, or upon solitary indulgences, or when the sexual appetite is increased, as is sometimes the case, tonics are more especially indicated, and may be prescribed from the first, if the bowels be kept regularly open. In such circumstances vascular depletion is contra-indicated, and evacuations of any kind ought to be cautiously practised. The chalybeate mineral waters, soda water, or other waters containing fixed air; the vegetable tonics, with soda; the tincture of the sesqui-chloride of iron, taken in camphor mixture, &c., are most appropriate in such cases, aided by early rising and exercise in the open air.

44. iv. A *Fourth Indication* has been advised by some writers, viz., *to restore to its proper seat or form any other complaint, upon the removal or spontaneous cessation of which the hypochondriacal affection had supervened.* This intention, however, cannot be often fulfilled, for an herpetic eruption may not be restored, although an artificial eruption may be easily produced. The restoration of an hæmorrhoidal flux is more readily procured; but a judicious recourse to local depletions, and to suitable diet and regimen, will be still more beneficial. The development of the gouty paroxysm, when hypochondriasis follows the disappearance of gout, has likewise been advised; but attempts to accomplish this do not always succeed; they may even aggravate the complaint. The means just mentioned will sometimes prove so serviceable as to render such attempts unnecessary; and yet I have seen instances in which these means have failed, and for which I have been obliged to recommend a more liberal diet and regimen, with change of air, travelling, &c. When hypochondriasis follows periodic fevers, this indication is entirely out of the question. In these cases, as well as in those produced by malaria, humidity, &c., the chylopoietic viscera are generally in fault, and require, especially the biliary organs, strict attention. If this complaint is consequent upon suppressed discharges from the uterus, or is even associated with an increase of the natural evacuation, or with a mor-

bid secretion from this organ, particularly about the change of life, organic change in the uterus may be the cause of the nervous disorder; but the restoration of the discharge in the one case, or the removal of the morbid secretion in the other, will have but little effect, either upon the lesion of the uterus or upon this affection. The nature of this lesion, and the states of the vascular system, and of the digestive viscera, will require the chief attention in these circumstances.

45. v. *Remedies and Modes of Practice advised by authors.—a. General blood-letting* has hardly been noticed by any of the numerous writers on hypochondriasis, and *local depletions* have been directed by few excepting to the anus, in order to remove hæmorrhoids or hepatic fulness. M. BROUSSAIS and Dr. GULLY, however, recommend leeches to be applied to the epigastrium on account of inflammatory irritation in the digestive mucous membrane, which they consider to exist in most cases of this complaint, and which no doubt forms a part of the pathological states in many cases. In these an *antiphlogistic regimen* is always requisite, although too frequently neglected by both patient and practitioner.

46. *b. Aperients* and *laxatives* are generally serviceable when judiciously selected; but acrid purgatives are often injurious, although not to the extent believed by BROUSSAIS and his followers, unless they be frequently prescribed. My objections to mercurial purgatives (◊ 41) in hypochondriasis are not altered by what has been advanced by WINTRINGHAM, RIEFF, CURRY, and others, in their favour. At the commencement of this century, a calomel epidemic prevailed in British practice, and this medicine was prescribed very generally, and very often injuriously, in this and many other complaints. The repeated doses of it directed by the late Dr. CURRY not unfrequently aggravated the disorder, or converted it into melancholia. The much milder means, however, recommended by the late Mr. ABERNETHY, namely, an occasional blue-pill at bedtime, and a stomachic aperient in the morning, were often of great benefit, and were rarely attended by any inconvenience.

47. *b.* The propriety of prescribing *narcotics* and *anodynes* in hypochondriasis has been much discussed. Circumstances often arise to require a prudent recourse to them, and others appear which contra-indicate them. Some of them, particularly *opium*, afford temporary relief, and yet are injurious if largely or frequently employed. *Opium* was recommended by TRALLES (*De Usu Opii*, s. iii., p. 35), DEIDIER (*Consult. et Obs.*, t. i.), and others, and by THILENIUS in conjunction with the mineral acids. Dr. CULLEN considered it injurious. Hypochondriacs often resort, and readily become addicted to it; but, unless when under its influence, all their distressing feelings are aggravated by it. Even when used in moderation, it is relinquished with difficulty. I have met with several instances of hypochondriasis, presenting in some an hysterical character, as in females, and in others the melancholic, in which opiates had been prescribed occasionally for severe or painful symptoms, and in which calomel had been given as an aperient; and in these the patients afterward had resorted to the same means without medical advice, until the former was regularly taken in excessive doses, every three or four hours, and the latter every second or third night. In two cases, where the acetate of morphia, and in one, where the muriate had been prescribed, these substances were long afterward continued three or four times in the day, on account of their effects upon the spirits, and gradually increased to one or two grains each dose. In neither of these was there any organic disease detected upon the strictest examination, although there was much functional disorder of the digestive organs. The strength and healthy looks of these patients are now almost restored, by reducing very gradually the dose of the narcotic; by relinquishing calomel, and by enforcing the practice recommended in this article. Yet I fear that the opiate will never be entirely given up, and that the dose of it will even be increased hereafter. In such circumstances no patient can be trusted. The practitioner, in order to overcome this noxious habit, may try the effect of varying the narcotic, of adulterating it, or of combining it with tonics, aromatics, &c.; of diverting the mind by amusement or travel, and of rousing the vital energies by early rising, exercise, tonics, and light diet. Persons who have habituated themselves to opiates will, however, rarely tolerate any other narcotic. I have prescribed for them *hyoscyamus*, *belladonna*, and *conium*. The first and last of these were too weak; the second seemed for a while to answer, but was soon relinquished. These, however, are often beneficial in this complaint, especially in certain of its complications, in conjunction with camphor or other antispasmodics, or with purgatives, stomachics, &c.; or with tonics or carminatives, according to the numerous modifications it assumes. The *hydrocyanic acid* is also very serviceable in similar circumstances and combinations to those in which narcotics are indicated. THILENIUS and WURZER recommended the laurel water in this complaint long before the discovery of its active principle.

48. *c. Tonics* of various kinds have been prescribed in order to rouse the nervous energy; but they require much discrimination for the reasons already stated (◊ 42). As congestions and obstructions of important viscera, also, should be removed, they ought to follow, or to be conjoined with means calculated to fulfil this intention, and selected with due reference to it. On this account, the preference given to *chalybeate mineral waters* by ZACUTUS LUSITANUS, DRELINCOURT, HOFFMANN, and others, especially those springs which contain deobstruent and aperient salts, along with the iron, is fully justified. I have seen the *arsenical solution* given in some instances, but it is a precarious medicine in this complaint—it may be even hazardous, and it is not justified even by the circumstances of the affection having followed periodic fever. I have rarely seen any benefit result from even a moderate use of *wine*. It may afford a temporary relief, but it is most frequently injurious, by increasing vascular plethora and visceral engorgement. Circumstances, however, may arise in which it should be prescribed medicinally.

49. *d.* Small doses of *ipecacuanha* have been advised by HUFELAND, but they are most ser-

viceable in conjunction with *purgatives*, in order to increase their action, or with *diaphoretics* when the skin is dry and harsh, and then they should be aided by the warm bath. The production of *artificial eruptions*, as advised by Ritter, Jenner, and the author; or the insertion of *setons* or *issues*, as directed by De Meza and others, is often of service, particularly when there is evidence of irritation, or of congestion or obstruction of some internal organ. In these cases, the application of *moxas* or of *blisters*, or of stimulating and *rubefacient liniments*, may likewise be tried.

50. *e.* Dr. Gully justly remarks respecting the *Hygeienic treatment* of hypochondriasis, that the mental distractions accompanying the participation in exciting social scenes, the vigorous exertion of the voluntary power implied in strong muscular exercise, and the shocks given to the entire nervous system, are always beneficial in this complaint. The hypochondriac should be persuaded to the exertion of his volition in active muscular exercises. He does not lack muscular power, but he wants the mental energy necessary to its exertion. He should always walk or ride before his meals, rise early, and take half an hour's exercise in the open air before breakfast. His mental faculties, also, should be actively engaged, as this writer very judiciously advises, on matters alien to his personal health. His imagination should be roused and directed towards other subjects. Although perturbed only with reference to his health, his fears should be met by the reasoning and feeling of his physician, who should endeavour to gain his confidence by evincing a due interest in his case, and combat his morbid feelings in a manner which an educated tact will readily suggest.

51. Upon the whole, although the treatment of hypochondriacs requires to be modified in a thousand ways to meet the innumerable phases of the complaint and fancies of the patient, the means advised by Stoll (*Rat. Med.*, P. i., p. 245) will be found the most generally appropriate, and the most beneficial, if persevered in: these are, abstemious diet, early rising, with friction of the abdomen in the morning, cold bathing and warm clothing, and exercise in the open air.

Bibliog. and Refer.—*Galenus*, De Loc. Affect., l. iii., c. 7.—*J. A. Grabe*, Casus laborantis Affectu Hypochondriaco, &c. Giess., 1606.—*J. Wolf*, De Morbo Hypochondriaco, ejusque Generatione et Curatione. Helmst., 1621, 1622.—*L. Fischer*, De Affectu Hypochondriaco. Brunsvic., 1624.—*M. Martini*, De Morbis Mesenterii abstrusioribus; item Affectionum Hypochondriacarum Historia et Curatio, 12mo. Leips., 1630.—*Ballonius*, Cons. ii., No. 33, 49; iii., No. 40, 54.—*Lothus*, De Morbo Literatorum, qui vulgò Affectus Hypochondriacus indigitatur, 4to. Regiomonti, 1631.—*Rolfink*, De Affectu Hypochondriaco, 4to. Jenæ, 1631; et De Affectione Hypochondriacâ, 4to. Jenæ, 1656.—*H. Hering*, De Melancholiâ, in Genere et Affectione Hypochondriacâ in Specie Brem., 1638.—*Bautzmann*, De Affectione Hypochondriacâ, 4to. Leyde, 1643.—*R. Nicander*, Historia Feminæ bis triennio Hypochondriis laborantis, 8vo. Par., 1646.—*Weikard*, Verm. Schriften, i., p. 174; ii., p. 174.—*M. Geiger*, Microcosmus Hypochondriacus, sive de Melancholiâ Hypochondriacâ. Monach., 1651.—*Drelincourt*, Ergo Affectioni Hypochondriacæ Chalybs, 4to. Monspelii, 1654.—*H. Couring*, De Malo Hypochondriaco, 4to. Helmstadii, 1662.—*N. Highmorus*, Exercitationes Duæ de Passione Hysterica et de Affectione Hypochondriacâ, 12mo. Oxon., 1660; et De Hysteriâ et Hypochondriacâ Passione Epistola responsoria ad Willis, 4to. Lond., 1670.—*Fridericii*, De Affectûs Hypochondriaci genuinâ indole, 4to. Jenæ, 1662.—*P. Ammann*, De Affectione Hypochondriacâ, 4to. Leips., 1664.—*Waldschmied*, De Affectione Hypochondriacâ, 4to. Giessæ, 1666.—*Schenck*, De Passione Hypochondriacâ, 4to Jenæ, 1666; item De Malo Hypochondriaco, 4to. Jenæ, 1668; et Æger laborans Malo Hypochondriaco Scorbutico. Jenæ, 1670.—*P. Trombetti*, Della Passione Hypochondriaca. Genoua, 1674.—*Franchimond à Franckenfeld*, Nexus Galenico—Hippocraticus de Passione Hypochondriacâ. Prag., 1675.—*G. W. Wedel*, Æger Hypochondriacus, 4to. Jenæ, 1676; item De Morbo Hypochondriaco, 4to. Jenæ, 1676.—*Beckmann*, De Affectione Hypochondriacâ, 4to. Lugd. Batav., 1676.—*O. Borrichius*, De Malo Hypochondriaco, 4to. Havniæ, 1676.—*Ettmüller*, De Malo Hypochondriaco, 4to. Leips., 1676.—*P. Zacchias*, De Malo Hypochondriaco, l. ii. Rom., 1679.—*Willis*, Pathol. Affect. Hysteric. et Hypoch. vindicata, Opp. i.—*G. S. Bologna*, De l'Ipochondria e suoi Accidenti. Wien., 1684.—*Legier*, Ergo Hypochondriaci mollius purgandi, 4to. Parisiis, 1681.—*Farra*, Dell' Ipochondria e suoi Accidenti e Remedi. Venez., 1686.—*H. Joly*, Discours sur une étrange Maladie Hypocondriaque et Venteuse, &c. Paris, 1689.—*Lange*, Traité des Vapeurs, ou leurs Effets et leurs Remèdes, &c. Paris, 1689.—*J. Chastellain*, Traité des Convulsions ou Vapeurs Hystériques. Paris, 1691.—*J. Lanzoni*, Miscell. Acad. Nat. Curios., dec. iii., an. 2, 1694, p. 41.—*C. Schreter* et *J. A. Mercklin*, in Ibid., dec. iii., an. 5 & 6, 1697, 1698.—*J. C. Fehr*, Ephemer. Acad. Nat. Curios., cent. 9 & 10, p. 275.—*C. B. Behrens*, in Ibid., cent. 3 & 4, p. 445.—*G. Schuster*, Nova Acta Acad. Nat. Curios., vol. ii., p. 24.—*R. F. Ovelgün*, in Ibid., vol. v., p. 312.—*D. G. Thebesius*, in Ibid., vol. x., p. 225.—*G. E. Stahl*, De Vena Portæ Porta Malorum Hypochondriaco, &c., 4to. Hal., 1698.—*M. Crugener*, De Materia Perlata, das iste eine Bewehrte Artzeney wider Malum Hypochondriacum, &c., 8vo. Franckf., 1712.—*F. Hoffmann*, De Vera Morbi Hypochondriaci Sede, Indole ac Curatione. Hal., 1719.—*A. C. Meineke*, De Vera Morbi Hypochondriaci Sede, Indole et Curatione. Hal., 1719.—*Baglivi*, De Pr. Med., l. i., c. 9.—*Vallisneri*, Opp. iii., p. 416, seq., 507.—*Wightmann*, Ueber den Nutzen gewisser Bewegungen des Körpers zur heilung Hartnäckiger Hypochondrie, 8vo. Leips., 1720.—*J. Virdet*, Sur les Vapeurs qui nous arrivent. Yverdon, 1726.—*Sir R. Blackmore*, A Treatise on the Spleen and Vapours, or Hypochondriacal and Hysterical Affections, &c., 4to. Lond., 1725.—*N. Robinson*, System of the Spleen, Vapours, and Hysterical Melancholy. Lond., 1729.—*Mandeville*, Treatise of the Hypochondric and Hysteric Diseases. Lond., 1730.—*Dover*, Phys. Legacy, &c., p. 68.—*G. Cheyne*, The English Malady, or a Treatise on Nervous Diseases of all Kinds. Lond., 1739.—*M. Fleming*, Neuropathia, seu de Morbis Hypochondriacis et Hystericis Libri., iii. Poema Eboraci, 1740.—*Struve*, Idea Mali Hypochondriaci, ejusque Preservatio, 4to. Kiloniæ, 1741.—*H. Barnstein*, Beschreibung der Wunderlichen Hypochondriachen Krankheit oder von der Darmsucht. Erf., 1751.—*Brendel*, De Valetudine ex Hypochondriis, 4to. Gottingæ, 1752.—*Alberti*, De Morbis Imaginariis Hypochondriacorum. Hal., 1755.—*G. Schuster*, Observationes Therapeuticæ, in quibus Hypochondriorum, &c., 8vo. Leips., 1755.—*G. Turner*, De Morbo Hypochondriaco, 8vo. Edin., 1755.—*A. Fracassini*, Naturæ Morbi Hypochondriaci Investigatio, 4to. Veron., 1758.—*Triller*, Programma de Vino Modico Hypochondriacis salutari, 4to. Vittenb., 1759. Vide Opuscul. Med., i., exer. ii.—*S. A. Ponticelli*, Di Tre Specie di Affezione Isterica ed Ipochondriaca, 8vo. Lucca, 1759.—*P. Pomme*, Essai sur les Affections Vaporeuses de Deux Sexes. Paris, 1760.—*G. V. Zeviani*, Della Rachitide, del Flato Ipochondriaco, &c., 4to. Veron., 1761; and Ueber die Hypochondrie, &c. Leips., 1794.—*R. Whytt*, Observations on Nervous Diseases, 8vo. Edin., 1765.—*C. Bisset*, Medical Essays, 8vo. Newcastle, 1766.—*J. U. Bilguer*, Nachrichten im Absicht der Hypochondrie. Kopenhagen, 1767.—*J. Berkenhout*, A Treatise on Hysterical and Hypochondriacal Affections, 8vo. Lond., 1775.—*Neumberg*, Museum der Heilkunde, b. iv., s. 47.—*Lindt*, in Ibid., b. iii., p. 215.—*D. W. Triller*, De Vino Modido Hypochondriacis salutari, 4to. Franc., 1776.—*A. Wilson*, Medical Researches on Hysteria and Hypochondriasis, &c., 8vo. Lond., 1776.—*J. A. Oehme*, Ueber die Hypochondrie, 8vo. Dresd., 1777.—*W. Perfect*, Methods of Cure in Hypochondriasis, Insanity, &c., 8vo. Rochest., 1778; and Cases of Insanity, Hypochondriasis, &c., 8vo. Lond., 1781.—*Cl. Revillon*, Recherches sur la Cause des Affect. Hypochondriaques, 8vo. Par. 1779.—*De Meza*, Soc. Med. Havniensis Collect., vol. ii., p. 70.—*J. H. Schönheider*, in Ibid., p. 212.—*D. Morelot*, in *Sedillot*, Réc. Périod. de la Soc. de Méd. de Paris, t. xxx., p. 54.—*Odier*, in Annales de la Soc. de Méd. Prat. de Montpellier, t. xvi., p. 89.—*A. Comparetti*, Occursus Medici de Vaga Ægritudine Infirmitatis Nervorum, 8vo. Venet., 1780.—*Cullen*, Clinical Lecture, in New-London Medical Journal, vol. ii., p. 3.—*J. C. Stumzer*, Ueber das Betragen in Nervenkrankheiten, 8vo. Wien., 1783.—*F. Alsinet*, Nuevo Metodo para curar Flatos, Hypochondria, &c., 8vo. Madr., 1786.—*E. Platner*, Ueber die Hypochondrie, 8vo. Leipz., 1786.—*A. A. Etzel*, De Hypochondriaco, 8vo. Vien., 1789.—*S. Freeman*, A Letter to Hypochondriac Patients. 8vo. Lond., 1789.—*Moser*, Novam Mali Hypochondriaci Therapiam sistens, 4to. Moguntiaci, 1792 (*This new method consists in suppressing flatulent eructations*).—*G. M. Gattenhoff*, De Hypochondriasi, 8vo. Tic., 1790.—*H. Tabor*, Anweisung für Hypochondris-

ten, 8vo. Duerkh., 1793.—*J. Rymer*, On Dyspepsia, Hypochondriasis, and Gout, 12mo. Lond., 1795.—*Sims*, in Mem. of the Med. Soc. of Lond., vol. v.—*F. A. Weber*, Morbi Hypochondriaci Signa ac Diagnosis, 8vo. Rost., 1795.—*J. Kaempf*, Abhandlung von einer Neuen Methode die Hypochondrie zu Heilen, 8vo. Leipz., 1796 (*This new method is the frequent administration of enemata*).—*Müller* and *Hoffmann*, Für Hypochondristen, Nervenkranke, &c. Frankf., 1795.—*J. C. Tode*, En Kort Afhandling om Hypochondrie, 8vo. Kiobenh., 1797; and Nöthiger Unterricht für Hypochondristen, &c., 8vo. Kopenh., 1797.—*J. W. L. Von Luce*, Versuch ueber die Hypochondrie und Hysterie, 8vo. Gotha, 1797.—*A. Thomson*, Untersuchung der Natur, Ursachen, und Heilmethode der Nervenbeschwerden. Hanover, 1798.—*J. N. A. Leuthner*, Heilungsversuche der Milzdünste durch den Gebrauch des Gemeinen Wassers, 8vo. Ulm., 1799.—*L. C. Lonyer-Villermay*, Recherches sur l'Hypocondrie, 8vo. Par., 1802; and Traité des Maladies Nerveuses ou Vapeurs, 2 t., 8vo. Par., 1816.—*Baldinger*, N. Mag., b. vii., p. 542.—*J. W. Becker*, Guter Rath an meine Freunde die Hypochondristen, 8vo. Leipz., 1803.—*E. S. V. Embden*, Versuch einer Hypochondralgologie, 8vo. Bremen, 1804.—*W. Liardet*, The Hypochondriac, a Poem, 8vo. Lond., 1805.—*L. Storr*, Untersuchungen ueber den Begriff, &c., der Hypochondrie, &c., 8vo. Stuttg, 1805.—*K. Wezel*, Sieg ueber die Hypochondrie, 8vo. Erf., 1805.—*J. W. L. von Hohnstock*, Ueber Hypochondrie und Hysterie und deren Heilart, 8vo. Ilmenau., 1816.—*J. Reid*, Essays on Insanity, Hypochondriasis, &c., 8vo. Lond., 1816.—*K. J. Zimmermann*, Versuch ueber Hypochondrie und Hysterie, 8vo. Bamb., 1816.—*Louyer-Villermay*, Dict. des Sc. Méd., t. xxiii., p. 117. Par., 1818.—*M. Ricotti*, Storia d'una rara Malattia Nervosa, 8vo. Pavia, 1818.—*J. P. Falret*, De l'Hypocondrie et du Suicide, 8vo. Par., 1822.—*J. P. G. Barbier*, Précis de Nosolog. et de Thérapeutique, t. ii., p. 302.—*M. Georget*, De l'Hypochondrie et de l'Hystérie, 8vo. Par., 1824; and Dict. de Méd., t. xi. Par., 1824.—*F. G. Boisseau*, Nosographie Organique, t. iv., p. 757.—*Foville*, Dict. de Méd. Prat., t. x. Par., 1838.—*Prichard*, Cyc. of Pract. Med., vol. ii., p. 548. Lond., 1833.—*J. L. Brachet*, Recherches sur la Nature et le Siége de l'Hystérie et de l'Hypocondrie, 8vo. Paris, 1832.—*J. M. Gully*, An Exposition of the Symptoms, Nature, and Treatment of Neuropathy, or Nervousness, 8vo. Lond., 1837.

HYSTERIC AFFECTIONS.—SYN. *Hysteria; παθος ὑστερικον* (from *ὑστερα*, the womb,) *ὑστερικη πνιξ*, *Suffocatio Uterina*, *Suffocatio*, *Suffocatio Mulierum*, Pliny. *Affectio Hysterica*, Willis, Sydenham. *Malum Hysterico-hypochondriacum*, Stahl. *Asthma Uteri*, Van Helmont. *Ascensus Uteri*, *Strangulatio Vulvæ*, *Passio Hysterica*, Auct. var. *Hysteria*, Sauvages, Linnæus, Vogel, Cullen. *Hyperkinesia*, *Hysteria*, Swediaur. *Clonus Hysteria*, Young. *Suspasia Hysteria*, Good. *Vapeurs*, *Mal de la Mère*, *Affection Hystérique*, Fr. *Mütterkrankheit*, *Mütterbeschwerden*, *Aufsteigen der Mütter*, Germ. *Isterismo*, *Mal di Matrice*, Ital. *Fits of the Mother*, *Rising of the Mother*, *Vapours*, *Hysterics*, *&c.*

CLASSIF.—2. *Class*, Nervous Diseases; 3 *Order*, Spasmodic Affections (*Cullen*). 4. *Class*, Diseases of the Nervous Function; 4. *Order*, Affecting the Sensorial Powers (*Good*). II. CLASS, III. ORDER (*Author in Preface*).

1. DEFIN.—*Nervous disorder, often assuming the most varied forms, but commonly presenting a paroxysmal character; the attacks usually commencing with a flow of limpid urine, with uneasiness or irregular motions, and rumbling noises in the left iliac region, or the sensation of a ball rising upward to the throat, frequently attended by a feeling of suffocation, and sometimes with convulsions; chiefly affecting females from the period of puberty to the decline of life, and principally those possessing great susceptibility of the nervous system, and of mental emotion.*

2. Under this definition may be arranged all those disorders which, from their varied and changing forms, and their resemblance to many serious, and even to several dangerous or structural diseases, have puzzled and misled the inexperienced. SYDENHAM first gave a full, and, upon the whole, a satisfactory account of hysterical affections; and WHYTT, more recently, threw additional light on several of their forms and relations. CULLEN accurately described their more convulsive states, but neglected those anomalous or irregular forms of complaint which are equally frequent and important with these. From the descriptions of GOOD, MACINTOSH, and some other recent writers, it might at once be inferred that their experience as to this disorder was very imperfect; that they were entirely ignorant of the writings of SYDENHAM and WHYTT; and that the state of our knowledge in respect of it had retroceded, instead of having advanced, with the general progress of science. Very recently, however, the able and elegant treatise of Dr. CONOLLY has retrieved the character of our literature as to hysteria, and furnished us with a more comprehensive view of its nature and treatment.

3. The varieties, forms, and states of hysterical affection are so numerous, that the difficulty of describing and arranging them is very great. The modifications consequent upon age, temperament, diathesis, habit of body, states of nervous susceptibility, physical and moral education, and on the states and grades of society, are so various, that they cannot all be comprised within the limits to which I am necessarily confined. Enough, however, will be advanced to guide the practitioner to the recognition of the nature of such affections as may not fall exactly under any of the varieties into which I shall divide this complaint. The difficulty of accurately describing disease is great, inasmuch as the phenomena constituting it vary in every case with the circumstances just enumerated, with the causes producing them, and with numerous accidents and occurrences, independently, even, of their duration and intensity; but it is especially great in respect of hysteria. In the history about to be given of it, I shall notice, 1. Its more mild and regular forms; 2. Its more severe states; and, 3. The more irregular and anomalous conditions or modes in which it sometimes manifests itself.

4. I. THE MILDER AND MORE REGULAR FORMS OF HYSTERIA present various modifications, depending chiefly upon the number of the circumstances or symptoms characterizing them.—*a.* They appear generally in paroxysms or fits, and commonly begin by painfulness or uneasiness in the left iliac region, or hypogastrium, or in the left side; and are often preceded by a large flow of limpid urine, or by palpitations or difficulty of breathing, flatulency, and rarely by nausea or vomiting. From either of these situations in the abdomen a ball, the *globus hystericus*, seems to move, with a rumbling noise, and with various convolutions, to the stomach, and thence to the throat or pharynx, where it remains for some time, and gives rise to a feeling of impending suffocation. The attack in its slighter forms may not proceed farther, or it may be attended by several other phenomena of a slight or severe kind. In some cases, headache, stiffness about the larynx, dyspnœa, general uneasiness, cramps, &c., precede or accompany the attack; in others a vermicular or undulating motion of the abdominal muscles attends the rising of the ball, or *globus*.

5. *b.* The seizure, however, may not end with a sense of strangulation attending the ascent of the ball to the throat. Other phenomena either attend this or rapidly follow it, particularly lassitude, sadness, despondency; a sense of coldness, stiffness, or weight in the limbs, with sudden and momentary spasmodic contractions, or general shudderings; headache, noises in the ears, or vertigo; pain and flatulence of the stomach; irregular distention of the abdomen, with borborygmi; a sense of constriction in the throat and pharynx, sometimes with swelling; oppression at the chest, dyspnœa, and irregular breathing; and palpitation, or irregular action of the heart. These fits may occur at any time through the day, but usually two or three hours after a meal. After a time either copious eructations of air take place, or anguishing pain at the epigastrium, or in the left side, supervenes, which the patient endeavours to relieve by rubbing violently with the hand. She is frequently incapable of utterance, although evincing much bodily and mental agitation, which generally terminates with immoderate or continued fits of laughter, sometimes causing temporary or alarming suspension of respiration, or with fits of weeping, without any assignable cause, or with an alternation of both. With these latter symptoms the attack may cease. It may recur in a short time, or not for a considerable period.

6. *c. When hysteria assumes a truly convulsive form*, spasmodic actions follow upon the feeling of suffocation, occasioned by the globus hystericus, as it reaches the throat. In delicate women, with great mobility of the muscular system, the convulsions are feeble, and present chiefly a clonic or asthenic character; but in the strong and plethoric they are more sthenic or tetanic. The trunk of the body is writhed to and fro, and the limbs are variously agitated, one arm and hand (most frequently the right) commonly beating the breast repeatedly. The patient often beats her head against the bed or couch, tears her hair, screams, shrieks, laughs, or sobs and cries immoderately. Sometimes the trunk remains stiff, while the arms and limbs are tossed in every direction. The muscles of respiration participate in the struggle, and breathing is effected slowly, laboriously or deeply, and spasmodically, often with deep sobs and constriction in the situation of the diaphragm, and occasionally with hiccough. The respiratory efforts are rendered still more laborious by spasm about the throat, pharynx, and glottis, and the patient often applies her hands to her neck and throat, and rubs or strikes the epigastrium, or left side, with the hand; during the struggle she sometimes bites her arms or hands, or even the by-standers. The abdominal muscles are tense, or irregularly constricted; the belly, especially about the navel, is often drawn inward, and the sphincters are firmly constricted. The action of the heart is increased with the severity of the convulsions. In some cases, however, it is not much, if at all, accelerated; in others it is very irregular and unequal; and in all the veins of the neck are remarkably distended, the carotids beating with more than usual strength. The face is flushed and tumid, or full, particularly in the plethoric; but in delicate females it is occasionally pale. The temperature is usually reduced, especially in the extremities, at the commencement of the attack; but it is increased as the convulsions proceed, although in the non-plethoric it sometimes either continues below, or does not rise above the natural standard.

7. The *duration* of the fit varies from a few minutes to two or three hours. The recovery from it is attended by a flow of tears, or by a fit of laughter, or by an exclamation, and is generally rapid and complete. Sometimes the patient complains of numbness, or partial palsy of a limb, or of headache, or of loss of voice, after a seizure; and when a copious discharge of limpid urine has not ushered in, it often follows, or both precedes and follows the attack. Exhaustion, with a desire of remaining perfectly quiet, attends the cessation of the convulsions, but the patient is soon restored to her usual state. She usually retains more or less consciousness of what has occurred in the fit, although she wishes to be thought unconscious of all that has taken place. Loss of consciousness may, however, exist when the fit assumes a very severe or an epileptic form, which it sometimes does in plethoric females; but it is not a general symptom of the purely hysterical convulsion, though ascribed to it by Cullen and many others. Such fits are ready to recur from time to time; and in the intervals the patient displays much fickleness or irritability of temper, is capricious, or even experiences fits of laughing or crying, or of both.

8. II. The more severe Forms of Hysteria vary more in their characters than in their intensity. In some cases, particularly in the plethoric, and when the attack is consequent upon obstruction or suppression of the catamenia, the fit presents most of the symptoms of an epileptic seizure. But the accession is not so sudden as in it, and many of the premonitory symptoms of hysteria are present. The subsequent exhaustion, stupor, or sleep is also not so great as after a fit of epilepsy, and the patient rarely injures the tongue or foams at the mouth. She is, however, generally deprived of consciousness. The face is tumid and flushed; the trunk presents a tetanic stiffness, while the limbs are tossed in every direction; and respiration is so laborious and so obstructed as apparently to threaten dissolution. In some cases the patient remains for a time seemingly without breathing, the throat and the veins of the neck being remarkably swollen and distended; and the action of the heart irregular, hurried, or slow, or entirely interrupted for two or three beats. In other instances she screams, or utters the most disagreeable and unnatural noises, and grinds the teeth. At last the convulsions cease, and after a period of more or less exhaustion she recovers, often complaining of headache or slight fatigue.

9. In some instances, after a severe fit, or after violent nervous agitation, and great disorder of the circulating and respiratory functions, the patient sinks into a state of coma, or of hysterical apoplexy, depending upon cerebral congestion. In other cases a complete state of collapse takes place, respiration being hardly observable, and the pulse so weak, slow, and small as not to be felt at the wrist. The surface and extremities become pale, cold, and in-

animate; and the patient continues in this almost lifeless state for a considerable time. Some of the instances of supposed death, in which persons have been said to have nearly escaped being buried alive, have been of this kind.* I have seen some instances of this form of hysteria—*hysterical syncope*—so severe as to occasion some alarm, and M. Villermay considers that death may supervene upon it. Extreme cases of this description have been noticed by Pliny, Lancisi, and others; the instance in which Vesalius began to dissect a body to which life returned on the application of the scalpel was probably of the same nature. But cases of hysterical coma, or of apoplectic congestion consequent upon the hysterical paroxysm, should not be confounded with these. In hysterical coma the pulse is but little affected; but in hysterical syncope it can hardly be felt at the wrist. Upon recovery from these states, especially from the latter, the patient often experiences catchings, spasmodic contractions of the extremities, shudderings, or convulsions of short duration, accompanied by forced or irregular respiration. Sometimes the paroxysm is not only severe, but is attended or followed by a kind of delirium, or by nymphomania of short continuance.

10. In a few instances, especially where hysteria is obviously dependant upon irritation or congestion of the uterus or ovaria, the paroxysms change their character, and assume the form of *catalepsy*, *ecstasy*, or of *somnambulism*, or either of these nervous affections takes the place of the hysterical seizure. I have seen several instances illustrating the connexion of these with the severer forms of hysteria; and in some the tenderness in a portion of the spinal column, so much insisted on by some recent writers, was detected. When these nervous affections are thus associated, the attack may commence either as a slight or as a severe hysterical fit, and pass in a short time into the cataleptic or ecstatic state, or it may begin in the form of ecstasy, catalepsy, or somnambulism, and pass into the hysterical convulsion; but I have likewise seen the paroxysm consist of one of these in its pure or unassociated state.† Besides these more severe states of the complaint, various symptoms may assume an unusual and distressing prominence; the sense of strangulation in the throat may be so great as to occasion the utmost distress and alarm, and it may be accompanied by inability of utterance, by flatulent distention of the belly, borborygmi, and remarkable undulations throughout the abdomen. Occasionally the slighter and severer forms of the complaint will alternate with each other; and the latter is frequently induced when the former has existed, by powerful mental emotions or sudden impression. Sometimes the severer fits alternate with loss of voice—*Aphonia hysterica*—or with temporary paralysis of certain parts, giving rise to *dysphagia*, or to *ischuria* in some instances; and they may even terminate in *epilepsy*, *mental derangement*, or *fatuity*. In some instances of severe hysteria in the unmarried state, I have observed puerperal mania supervene after marriage, and follow almost each confinement. These states of hysteria occur not merely in different persons, but sometimes in the same person at different times. Females who are liable to, or who have suffered from the disease, often acquire so much sensibility, or become so susceptible as to be strongly affected by every impression that occurs suddenly or by surprise.

11. In *the intervals* between the paroxysm the general health is more or less deranged; but some functions betray more disorder than others. Digestion is impaired, and there is often a craving after indigestible or hurtful articles, as cheese, cucumber, acid fruit, acids, pickles, &c.; or after food at improper hours. Digestion is usually attended by flatulence, borborygmi, lowness of spirits, and proneness to tears. The bowels are commonly costive; but they are sometimes lax or irregular. The tongue is red at the point and edges, and slightly furred or loaded, or somewhat white in the middle and base. The pulse varies, the least emotion or surprise causing great acceleration of it, or palpitations of the heart. The catamenia are seldom regular as to quantity or the period of appearance. They also often depart from the healthy character, in the various ways described in the article Menstruation. They may, moreover, be delayed, retained, suppressed, too frequent, excessive; or they may be painful, difficult, and attended by various phenomena, referrible to morbid conditions of the uterus or of the ovaria. They may also be preceded or followed by leucorrhœa. So much is the health of hysterical females disordered, and so intimate a connexion often exists between such disorder and the hysterical paroxysm, that the latter, especially in its slighter forms, seems merely an aggravation, or an exacerbation, of the more or less continued complaint, or as an increased state of the nervous symptoms.

[The intimate connexion between hysteria and the several disturbed conditions of the menstrual flow must have struck the clinical observation of every practitioner of enlarged knowledge. No pathological sequence is more closely associated than these two forms of diseased action. "In at least every three cases out of every four of hysteria," says Dr. Francis, "I have witnessed this association; and the restoration of the menstrual function to its healthy state has proved the precursor of the removal of hysterical annoyance."]

12. In those cases which are more obviously dependant upon uterine irritation or vascular determination to the sexual organs, irregular or painful menstruation is generally observed, and the discharge is preceded or attended by pain in the back, loins, or thighs, or in the sacrum and hypogastrium, with forcing or bearing

* [We have met with two instances in which females have lain in a *hysterical syncope* an unusual period of time; in one, consciousness, and apparently animation, were suspended during a space of three days; in the other for the space of seven days. In both cases the pulse was almost imperceptible, and the respiratory movements so feeble as scarcely to be detected by the closest observation.]

† [Most of the cases of female *mesmerization* which have lately attracted so much attention are nothing more than examples of *hysterical catalepsy*, excited through the influence of the imagination, *or self-induced*, through the operation of the will: a power which we believe is possessed by some females of highly nervous temperament and great impressibility; reminding one of the description of the susceptible Cleopatra, in Shakspeare: Eonarbus says, "Cleopatra, catching but the least noise of this, dies instantly; I have seen her die twenty times upon far poorer moment: she hath such celerity in dying." To which Antony replies, "She is cunning past man's thought."]

down, and sometimes by tenderness upon pressure above the pubis. Leucorrhœa is usually present, and sometimes also *dysuria*, or even *stranguria*, although not always mentioned or admitted by the patient. The menses may be very irregular—at one time excessive, and at another scanty; now too frequent, and afterward disappearing for months. The hysterical paroxysm is often connected with the approach or presence of the catamenia; but it is also often brought on at other times by mental emotions or surprise, and by fatigue, and in some instances it is characterized by signs of an unusual increase of the sexual appetite, amounting, in some cases, to temporary nymphomania, and constituting the *Hysteria libidinosa* of nosologists.

13. III. The Irregular and Anomalous States of Hysteria are so diversified that a full account of them can hardly be comprised in the limits of this article. As well as the more fully developed affection, they frequently depend upon excitement of the sexual nerves by feelings connected with the instinctive affections and appetites, or upon local irritation of the uterine system. In either case, the one acts upon the other—the mental excitement upon the organic functions, and the local irritation upon the mind; and brings within the range of its morbid influence various parts of the nervous circle; the altered sensibility attendant upon the local affection being manifested, not only in the primary seat of disturbance, but also in other parts, with which there is the most intimate sympathy in particular cases, or which, owing to their naturally exalted state of sensibility, most readily participate in the original affection. Granting that the nerves supplying the uterus, the ovaria, and the more external parts of generation, are in a state of morbid irritation—a state which the conditions and functions of those parts, as well as the symptoms, render extremely probable—the influence extended to other parts of the economy, particularly in susceptible or delicate persons, may be readily inferred. The relations of these nerves to those supplying the respiratory, circulating, and digestive organs; the circumstance of their being a part of the same system; the effects which they produce, both directly and indirectly, upon the circulation in the brain; and their intimate connexion with the nerves of sense and of the spinal axis, will serve to explain many of the phenomena, and to account for the multiplied mutations observed in hysterical affections. When a disposition to irritation or morbid excitement exists in the uterine nerves, those emotions or feelings which have an intimate relation to sexual function will often be sufficient to rouse this irritation, and to bring in its train certain of the various morbid manifestations generally associated with it, and constituting its more outward and evident phenomena. The intimate connexion existing mutually between certain mental emotions and uterine disturbance, whether the mental or the organic sensibility be first excited, and the close association of both with the more prominent symptoms of hysteria, are so fully established, and are so important in a practical point of view, that they should never be overlooked when affections of an anomalous, an irregular, or Protean form occur in females from the period of puberty to the decline of life. Many of the affections during this period of female existence not only proceed from the source here stated, and are truly hysterical in their pathological relations, but also simulate other maladies of a more serious nature, and therefore require to be accurately recognised in practice. They, moreover, do not only occur in different cases, but sometimes also several of them may appear in succession in the same person, or two or more of them may exist at the same time, thereby increasing the difficulty of diagnosis.

14. *A. Altered sensibility, or pain of a truly hysterical nature*, is a frequent occurrence, and in some cases may be mistaken for inflammation of a subjacent or adjoining viscus. The situations in which hysterical pains are most frequently felt are, *a*. The head, often attended with the clavus hystericus; *b*. Below the left mamma, or at the margins of the ribs; *c*. In the region of the stomach and spleen; *d*. In the course of the descending colon, and in the left iliac region; *e*. Above the pubis; *f*. In various other parts of the abdomen, or in the abdomen generally; *g*. In the region of the kidneys, sometimes extending in the course of the ureters; *h*. In one or more of the dorsal or lumbar vertebræ; *i*. In the sacrum; *k*. In the hip, or knee joint. Although these are the more frequent situations, pain may be felt so seriously in others as to alarm the patient, as in the pharynx and larynx, in one or both mammæ, or in the region of the liver.

15. *a*. Headache, with or without the *clavus hystericus*, generally limited in extent, especially to the forehead, is a frequent circumstance in both the regular and anomalous forms of hysteria; but I must refer the reader to what I have stated respecting it in the article Headache (§10).

16. *b*. *Pain below the left mamma, and above the margin of the left ribs*, is a very frequent occurrence. It may continue for weeks, or even for months, with little intermission. It is very circumscribed, is seldom attended with cough, but frequently with palpitation of the heart, and with increased sensitiveness to the impulse of this organ. It is sometimes, although not necessarily, increased by a forced inspiration, and by external pressure. The precise source of this pain cannot be stated with certainty. Dr. Addison examined the body of a young woman who had this pain for a considerable time in an aggravated degree, and who died suddenly in a fit. The colon, spleen, heart, and stomach were unaltered, but the cardiac orific of the stomach was surrounded by a ring of red injected vessels. Pain in these situations depending upon imperfectly developed hysteria is frequently mistaken for *pleuritis*. The absence, however, of cough, the quiet state of the pulse, particularly when the patient is in the recumbent posture, the versatility and mutability of many of the symptoms, the variability of the patient's mental motions, the existence of disordered catamenia, and especially the absence of the stethoscopic signs of the inflammatory disease, will be sufficient to indicate the nature of the affection. When this pain is attended with palpitations or with morbid sensitiveness of the heart's impulse, and especially if these alternate, or are connected with leipothy-

mia or syncope, *pericarditis* or organic *disease of the heart* may be erroneously suspected by both the patient and the practitioner. But a careful examination into the rational symptoms, comparing them with the signs evinced by percussion and auscultation, the occasional appearance of decidedly hysteric symptoms, as borborygmi, clangor intestinorum, the globus hystericus, uterine disturbance, and the state of the mind, will here disclose the nature of the disease. In this class of cases, there is also more or less disorder of the digestive organs, and in some, tenderness upon pressure of some of the dorsal vertebræ (◊ 23).

17. *c. Pain in the regions of the stomach and spleen* is another frequent manifestation of hysterical disorder, and is often so intense in the former that the patient screams, leans forward, and expresses the utmost agony. It generally comes on suddenly, and lasts from a few minutes to an hour or more. It is increased by pressure, although not very materially, and the pulse is not much affected. This pain may exist without any nausea or retching; but the bowels are usually costive or irregular. It is sometimes accompanied with a sense of heat or irritation in the pharynx, or is followed by a burning sensation at the epigastrium. There seems to be a very intimate sympathy between the *spleen* and the uterus; irritation of the latter exciting the sensibility and organic contractility of the former in such a manner as to occasion a belief that it is actually the seat of inflammatory action. The pain felt in the region of the spleen in hysterical cases is never so severe as that which is strictly referrible to the stomach, and pressure is endured much better in the former than in the latter, and often even gives relief. In all such cases, there is no swelling present as in *splenitis*, for which they may be mistaken; but attention to the history of the case, and the good effects of tonic and antispasmodic treatment, will remove any difficulty as to diagnosis, particularly if the functions of the uterus receive due attention.

18. *d. Pain in the course of the descending colon, and in the left iliac region*, may be the only or principal complaint in irregular hysteria. It generally also attends other forms of the disease, and is most frequently seated in the region of the sigmoid flexure, and is attended and aggravated by flatus, which causes a rumbling noise, followed by the globus hystericus, and occasionally by other nervous symptoms. In some instances the connexion of this pain with uterine disorder is very obvious; in others it is much less so. It is generally independent of disorder of the bowels, although irregularity of them is very frequently observed. That it is purely nervous, is proved by the symptoms, and by the effects of remedies.

19. *e. Tympanitic distention of the intestines* is not an uncommon symptom in hysterical females. Sir B. Brodie states that it has been mistaken for ovarian dropsy, and that the majority of cases of this disease supposed to be cured by iodine and other remedies have been of this nature. I was the first to employ and to recommend the use of iodine in ovarian dropsy, and I have derived great benefit from it in several cases; but I cannot see how these affections can be confounded with each other, as the diagnosis is remarkably easy. The absence of fluctuation, and the tympanitic sound produced by percussion, sufficiently indicate the cause of distention. It is only when flatus accumulates about the sigmoid flexure of the colon or in the cæcum that there is any resemblance to ovarian dropsy; but other regions, or the abdomen generally, may be distended by flatus, so as to occasion much pain, to impede respiration, and even to disorder the heart's action.

20. *f. Pain above the pubis* is sometimes complained of, but is rarely the only, or even the principal complaint. It is usually attended by more or less tenderness on pressure, and fulness in this situation, with disorder of the excretion of urine. It is generally associated with colicky pains in the abdomen, or in the loins, sacrum, or adjoining parts. It seems to depend upon congestion of the uterus, as it is frequently relieved by local depletion, and by the increase and regular return of the catamenia, which are commonly irregular or scanty. Pain, however, in this situation may attend an excessive discharge, as well as certain forms of leucorrhea. When it accompanies the former, it depends upon irritation, and is more decidedly nervous, unless in very plethoric females, in whom an excessive discharge proceeds from active determination of blood to the uterine system. In some cases of this kind, also, the digestive organs and the functions of the kidneys are much disordered.

21. *g. Irregular hysteria may be manifested by pain in various parts of the abdomen, or in the abdomen generally*, especially about the period of the catamenia, and when they are difficult or scanty. The pain often assumes a colicky character—the *Colica hysterica* of various authors—and shifts its situation. When it extends over the abdomen, it is sometimes accompanied with excessive tenderness and great inflation of the bowels. It may then be mistaken for *peritonitis*. Attention, however, to the pulse, the uterine discharges, to the fæcal and urinary excretions, and to the manner and state of the patient's feelings, will assist the diagnosis. In this form of hysterical affection, a marked incongruity will be observed between certain symptoms; greater pain and tenderness will be felt than the pulse, the tongue, and the evacuations should indicate; the most urgent symptoms will suddenly disappear, and as suddenly return; the mind will be variable and susceptible, and some unequivocal hysterical symptom will often arise. The pain and tenderness will frequently shift their situation; the urine will be natural, or pale and copious, instead of being scanty and high-coloured as in peritonitis; and the appearance of the countenance and the postures of the patient will be very different from those observed in inflammations seated in the abdominal cavity. The existence of some derangement in the periods, continuance, quantity, and quality of the uterine discharge, or of pain and difficulty of its accession, or of leucorrhœa, will also tend to confirm the diagnosis.

22. *h. Pain in the region of the kidneys* sometimes extending in the course of the ureters, and even to the urinary bladder, is occasionally the principal affection in hysterical patients. This pain is generally severe and sudden in its attack. When it extends to the bladder, dys-

uria is often present. This symptom is liable to be referred to inflammation of the kidneys; but here also attention to the existence of uterine disturbance; the marked incongruity of symptoms, particularly between the state of the pulse, the secretions, and evacuations on the one hand, and the pain on the other; the frequent shiftings, the sudden accession, and the as sudden cessation of the pain; and the absence of numbness in the thighs, of vomiting, and of symptomatic fever, will point out the nature of the affection.

23. *i. Pain in the dorsal or lumbar vertebræ*, with tenderness upon pressure of the spinous processes, is often complained of by females of a delicate constitution; and, although it may exist independently of hysteria, yet it is frequently associated either with it or with uterine irritation. Pain in any of these situations is often, also, connected with neuralgic affections in various parts of the body, especially in the mammary and intercostal nerves, and in the nerves of the lower extremities, as well as with certain affections of the joints about to be mentioned. Much diversity of opinion exists as to the nature of the pain and tenderness complained of in the spine, and as to its relation to hysteria and to uterine disorder. It cannot be doubted that it is frequently connected with one or the other, or with both, and that it may exist independently of either. It is also obvious, that although uterine irritation is often accompanied with hysteria, or with pain and tenderness in the spine, or with both, yet it may be present without either. This affection of the spine has been imputed to inflammatory action in the spinal cord or its membranes, or in some of the adjoining structures; but the accompanying symptoms, the duration of the affection, and the effects of treatment do not warrant this inference as respects at least the majority of cases. It has therefore been attributed to congestion, or to that very indefinite state to which the term irritation has been applied; but the evidence as to the existence of either of these is entirely of a negative kind. It is probable, however, that the uterine disorder, or the morbid state of the uterine nerves, is propagated by the sympathetic system to the roots of the spinal nerves, and that the sensibility of these last is thereby modified, either in this situation or in one or more of their ramifications. Here, as in many other cases, the primary affection of the ganglionic nerves may not be attended by any painful feeling, although it may induce pain in the voluntary nerves, which it consecutively implicates. From this it will appear that I ascribe the tenderness and pain in the dorsal or lumbar spine, sometimes associated with hysteria, as well as the painful or neuralgic affections, the tetanic and convulsive actions of the voluntary muscles, &c., to irritation or excitement propagated from the uterine nerves by means of the sympathetic to the roots of the spinal nerves, and to the spinal cord itself. But I, at the same time, admit that more or less of congestion, or of otherwise disordered circulation in the cord and its membranes, may sometimes be also thus produced, giving rise to various paralytic or anomalous symptoms sometimes associated with those already mentioned.

24. Hysterical affections, in which the symptoms are referred to the spine, are sometimes mistaken for ulceration of the intervertebral cartilages and bodies of the vertebræ. Sir B. Brodie has seen numerous instances of young ladies being condemned to the horizontal posture, and to the torture of caustic issues and setons for successive years, whom air, exercise, and cheerful occupations would probably have cured in a few months.* (*On Local Nervous Affections*, &c., p. 46). Similar instances have occurred to myself, and are familiar to most physicians. When the pain is first complained of in the spine, an attentive examination is often necessary to a positive diagnosis. When it is truly hysterical, it is seldom confined to a single spot, and it often shifts its place. The tenderness of the part is peculiar, and the patient often flinches more when the skin is slightly pinched than when pressure is made on the vertebræ. The pain is even severer than in real vertebral disease, and when spasms are present they often resemble the muscular contractions in *chorea*. Sir B. Brodie observes that surgeons sometimes apply a hot sponge to the spine, believing that, if the patient complains of pain on its application, this is a proof of the existence of *caries*. I perfectly agree with him in considering that a patient labouring under a nervous pain in the back will complain of the hot sponge even more than one in whom real disease exists. The history of the case, the appearance of other hysterical symptoms, the state of the catamenia, the aspect of the patient, her age, and other circumstances already noticed (§ 21, 22), will assist the diagnosis.

25. *k. Pain in the sacrum and os coccygis* depends upon irritation or disorder of the uterus, although the uterine discharge may not be manifestly deranged. It is sometimes associated with pain and tenderness above the pubis (§ 20). I have met with several cases in which pain in this situation has been referred to inflammatory action, or to organic lesion, and been greatly aggravated by depletions and a lowering regimen.

26. *l. Painful affections of the joints* are not infrequent in hysterical females. The joints most commonly attacked are the knee joints, but I have also met with it in the hip joint, the ankle, and in the wrist. Sir B. Brodie, whose experience of these complaints has been very extensive, states that "at least four fifths of the females among the higher classes of society, who are supposed to labour under diseases of the joints, labour under hysteria, and nothing else." In such cases, the pain is not generally fixed in any one part, but belongs to the whole limb; and when the symptoms are referred to the hip joint, the patient winces, and sometimes screams, when either the hip, or the ilium, or the side even as high as the false ribs, or the thigh or leg, as low as the ankle, is press-

* [We can point to many lamentable examples of the same kind of maltreatment in such cases in this country, especially at some institutions for the relief and cure of spinal complaints. Repeated instances of neuralgic or hysterical affections of the spine, we have reason to believe, are treated in these establishments by mechanical appliances, and the horizontal posture, and with a necessarily fatal result, which would easily yield to measures calculated to improve the general health; such as country air, exercise, cold sponging, and cheerful occupation. Idiopathic spinal disease is extremely rare, and the direful consequences of a mistaken diagnosis cannot be too strongly borne in mind by the clinical observer.]

ed upon. The morbid sensibility is chiefly in the integuments; and if they are slightly pinched or drawn from the subjacent parts, the patient complains more than when the head of the femur is pressed into the acetabulum. The more the patient's attention is directed to the part, the more is the pain increased; but if her attention be directed otherwise, she will hardly complain. There is no wasting of the glutei muscles, nor flattening of the nates, nor painful startings of the limb at night, nor frightful dreams, as in true hip-joint disease. Sometimes this hysterical affection is attended by much swelling of the nates, or of the thigh, without leading to abscess, owing to turgidity of the small vessels, and to effusion of the more deep-seated cellular tissue. In a case which I am now attending, there is a defined and circumscribed swelling; but there is not the least fluctuation, redness, nor throbbing. Instead of the wasting of the glutei muscles attending hip-joint disease, there is a bulging of the pelvis posteriorly, at the same time that it is elevated on the affected side. Hence the limb is apparently shortened, and when the patient stands erect the heel does not come in contact with the ground. This is owing to the predominant action of certain muscles, and to a long-continued indulgence in an unnatural position.

27. When the affection is referred to the *knee*, it resembles that just described. There is great tenderness, but it extends some distance up the thigh and down the leg, sometimes to the ankle and foot. The morbid sensibility is chiefly in the integuments, and not in the deep-seated structures. The leg is usually kept extended, and not bent as in disease of the knee joint. There is occasionally swelling, but this is rarely very great. In a case, however, that I attended the swelling was very great, its accession and disappearance being sudden. Sir B. Brodie remarks that this affection may continue, without material alteration, for weeks, months, or even for years. In the case just now referred to, recovery took place in a few days.

28. In hysterical affections of the joints, the catamenia are usually scanty, suppressed, or otherwise irregular. The extremities are frequently cold, and the affected limb is sometimes cold, and at other times warm; or there are frequent alternations of heat and cold. Occasionally, towards evening, the surface of the affected joint is hot to the touch, and the vessels turgid; but there is no throbbing or other indications of the formation of matter. As in many other forms of local hysteria, these affections generally appear during bodily exhaustion or mental depression: they are often excited by the depressing emotions of mind, and are as often benefited by whatever rouses the mental influence, or leads to bodily exertion.

29. *m. Painful affection of the breast* is sometimes met with in females subject to hysterical disorder, and is always connected with derangement of the uterine system. In some instances, especially in the more prolonged, the pain is attended with hardness and swelling of the gland. This affection is liable to be mistaken for a much more permanent and severe disease of the organ. It has been described by Sir A. Cooper and Sir B. Brodie; but it has been noticed by numerous other writers, in connexion with hysteria and uterine disorder, and, in rarer cases, with pain in the course of the spine. The patient shrinks from pressure, and cannot bear even the skin to be slightly pinched. The examination of the part often produces twitches, or motions resembling those of *chorea*; yet, if her attention can be engaged otherwise, neither much pain nor these motions will be occasioned. The morbid sensibility frequently extends to the axilla, and down the arm. This affection usually disappears after a treatment judiciously directed to the removal of congestion or irritation of the uterine organs, and to the regulation of their functions.

30. *n. Pain is sometimes complained of in the region of the liver, and at the margin of the right ribs.*—It may be mistaken for chronic *hepatitis*, and there may be some difficulty in forming the diagnosis. I was lately consulted in a case of hysteria where pain in this situation was a prominent circumstance, and was associated, moreover, with jaundice. A free use of mercurials had increased the hysterical affection, without benefiting the jaundice. This latter, however, disappeared during the use of the alkaline subcarbonates and taraxacum, with gentle bitters and tonics, and antispasmodics. The history of the case, the state of the uterine functions, the appearances of the tongue and of the alvine evacuations, and the absence of pain at the top of the right shoulder, will readily distinguish this affection from chronic hepatitis. The other circumstances alluded to above (§ 21, 22) will also assist the diagnosis.

31. *B. Irregular hysteria giving rise to, and simulating various spasmodic affections.*—*a.* Sometimes the respiratory organs are the seat of the spasmodic disorder. Occasionally the attack resembles that of *asthma*, the paroxysm of dyspnœa being preceded or attended with many of the symptoms of the hysterical fit. In other cases the patient is liable to paroxysms of a dry convulsive cough—the *Tussis hysterica* of authors. Not unfrequently the hysterical tendency manifests itself by severe or repeated attacks of *hiccough*, or of *sneezing*, sometimes accompanied by loud exclamations. Occasionally the spasmodic disorder affects some portion of the digestive tube, or shifts along it, giving rise to *dysphagia*, or to porraceous vomiting, or spasmodic gastrodynia, or to colic—the *colica hysterica* of authors. *Hysterical dysphagia* is sometimes attended by the globus hystericus, borborygmi, and even by a dread of swallowing fluids, or *hysterical hydrophobia*. *Hysterical gastrodynia* and hysterical colic are frequent attendants upon difficult, scanty, or otherwise disordered menstruation.

32. *b.* Hysteria may manifest itself chiefly by spasm of the voluntary muscles, giving rise to affections resembling *trismus*, *opisthotonos*, or *pleurosthotonos*. It may also occasion certain anomalous convulsions, and a form of *chorea*, which may be termed hysterical, as partaking of many of the characters of both diseases, and occurring about the period of puberty, generally in consequence of disordered menstruation. In all these affections the pulse is soft, and generally quick, particularly when the patient is erect or sitting up; but it becomes much slower, or natural, as to frequency, when she is recumbent. Irregularity of the menstrual discharge, or leucorrhea, and pain in the left side, or in

the region of the spleen, and sometimes tenderness or pain in some part of the spine, attend these affections. The same symptoms, circumstances, and peculiarities already alluded to with reference to painful hysterical affections (§ 21), will also serve to point out the nature of those just mentioned.

33. *C. Hysteria sometimes gives rise to various comatose, cataleptic, or soporific states.*—These states may supervene on imperfectly developed hysteria, or be preceded by hysterical symptoms, particularly borborygmi, the globus hystericus, a variable and excited state of mind, by uterine disturbance, or sudden arrest of the catamenia, &c.; and they may be directly occasioned by fright, sudden surprise, by various mental emotions, sexual excitement, or whatever startles or unexpectedly affects the patient. In these cases the irritation, whether mental, cerebral, or uterine, seems to induce congestion of the vessels of the head, or impeded circulation through them.—*a.* The relation of *catalepsy* to uterine or sexual excitement, and consequently to hysteria, has been manifested in most instances. Since the article Catalepsy was written, I have seen two cases of this affection, and in both these, as well as in those noticed in that article, this relation was evinced. In one of these the attack was observed by Mr. Byam and myself from its commencement until its termination.

34. *b. Coma* also occurs in rare instances, and even assumes the form of congestive apoplexy: the patient is insensible, the pulse is regular and full, the respiration is calm or profound, and the face is either natural or flushed. The seizure is usually preceded by indications of hysterical disorder, or of uterine affection; its duration varies from a few to many hours; and unless the patient be injudiciously treated, owing to its being mistaken for apoplexy, it terminates in rapid or sudden recovery of consciousness or voluntary motion, without any paralytic affection. This attack is merely a modification of catalepsy, or it nearly approaches the latter in certain of its states. At the time of writing this article, I was requested by Mr. Grant, of Thayer-street, to see a female who suddenly became comatose after evincing hysterical symptoms. He judiciously directed cold applications to the head, and a continuance of these for a few hours restored the patient. The *soporific* form of the attack, or that in which the patient lies as in a profound sleep, respiration being so low as hardly to be noticed, and the pulse weak and small, is more frequent than the foregoing, and has been noticed by Whytt, Villermay, Conolly, and others.*

35. *D. Hysteria may simulate paralytic affections.*—In such cases there is seldom a fully developed state of hysteria, but merely an occasional manifestation of certain of its symptoms, and a concomitance of uterine disturbance in some one of its forms. In most instances of these, as well as of other irregular hysterical affections, the variable character of the temper and mind, and the exalted sensibility and irritability of the body, are evinced.—*a.* The paralytic form of hysteria is sometimes connected with spasm, inability to move being attributable rather to this than to loss of power. Occasionally, also, it depends upon a deficient exertion of volition, the patient being capable of moving the limb when excited. This affection may occur in a single limb, or in both; it may even closely imitate *paraplegia.* Sir B. Brodie mentions an instance of hysterical paraplegia which had been improperly treated, before he saw it, by large depletions, &c., and which consequently terminated in sloughing of the nates, and in death; the brain and spinal cord were not altered from the healthy state; the thoracic and abdominal viscera were also sound.

[Paralysis, in these cases, often occurs in the secreting, as well as muscular structures, and seems to be the result of functional derangement of parts of the nervous system, while the common form is the result of structural lesion.]

36. *b.* When the paralytic state affects internal parts, particularly the digestive canal, it is limited in extent, and conjoined to spasm in its immediate vicinity. It is doubtful whether or not the dyspnœa of hysterical subjects may not also depend upon one or other, or, rather, upon both of these conditions. A seemingly paralytic state of the bladder is also met with in young women, especially those who are subject to pains in the loins, pelvis, or hypogastrium; and, like other paralytic affections, is sometimes attended by pain or tenderness in a portion of the spine. *Hysterical retention of urine* arises either from temporary paralysis of the muscular coat of the bladder or from spasm of the neck of this viscus, caused by irritation of adjoining parts. Hysterical females are liable to an excessive secretion of urine from mental emotion; and if imperfectly exerted volition, or other circumstances, allow its accumulation, the bladder soon loses its contractile power, owing to over-distention. There is every reason to suppose that many of the most constant and pathognomonic symptoms of hysteria proceed from irregular spasmodic and paralytic states of the muscular coats of the digestive canal, in connexion with inflation, propagated from the large bowels to a greater or less extent, and frequently as far as the œsophagus.

37. *c. Aphonia, or loss of voice,* is not an uncommon symptom of hysteria. It may occur alone or follow a paroxysm. It is doubtful, however, how far it depends upon deficient muscular power or upon spasm. It is sometimes associated with hysterical dyspnœa, cough, or the globus hystericus. Occasionally it is accompanied by symptoms indicating chronic laryngitis, or œdema glottidis. In a case of this description, lately under my care, the hysterical character of the affection became developed after the application of leeches.

38. *E. Hysteria may manifest itself chiefly by disorder of the mental emotions and faculties.*—The mental affections connected with hysteria may be referred to one or other of the following: 1st. To certain states of monomania, among which excited desire, amounting in some cases to nymphomania, may be enumerated; 2d. To *ecstasis* and mental excitement, in some cases of a religious nature, in others of different descriptions; 3d. To a state of

* [Two cases of hysterical coma recently occurred in our practice which were speedily relieved by the hot mustard pediluvia, and cold water turned in a constant stream upon the head.]

somnambulism; 4th. To a form of delirium, generally of a lively character, with which various hysterical symptoms are often conjoined; 5th. To various delusions, generally of a hypochondriacal kind, to which the patient may become subject, or even the victim, owing to the indulgence it may meet with from imprudently kind relatives; and, 6th. To a desire to feign various diseases, sometimes of an anomalous or singular form. In all these, the occasional occurrence of hysterical symptoms; complaints of shifting, transitory, or anomalous pains; disorder of the uterine functions; the nervous temperament, and the hysterical state of constitution will evince the precise nature of the affection.

39. *F.* Irregular or imperfectly developed hysteria not merely assumes one or other of these states, but sometimes presents two or more of them; or the one complaint may succeed the other. Hysteria may even put on certain anomalous appearances which cannot well be classed or accurately described, but which will be readily recognised by the physician after a careful examination of the uterine functions, and of the temperament, habit of body, constitution, occupations, recreations, and modes of living of the patient. Some of these local and simulating complaints, as coma, palsy, delirium, &c., may follow the regularly developed paroxysm in one of the severer forms above described (§ 8–10); but they as frequently appear as the prominent ailment, and as here mentioned. They may also gradually pass into, or nearly resemble other nervous or convulsive affections described under the heads of Chorea, Catalepsy, Cataleptic Ecstasy, Convulsions, Epilepsy, Hypochondriasis, &c.

[To these irregular and anomalous forms of hysteria may be added those attended with sanguineous discharges, and occasionally vomiting of a urinous fluid, with suppression of the renal secretion. Several remarkable cases of this kind have been collected by Mr. Laycock (*An Essay on Hysteria*, &c. Phil., 1840), embracing those, 1st. Attended with erratic discharge of urine; 2d. Cases with sanguineous discharges; 3d. Exhibiting remarkable derangement of the nervous system. The cases of erratic discharge of urine were marked by various anomalous symptoms, particularly paralysis; in some instances there was a long-continued and total suppression of the renal secretion, accompanied with hysterical and other features, but without any obvious erratic discharge of urine.* Dr. Arnold has related a case of hysteria, accompanied by impairment of sight and hearing, catalepsy, &c., in which the urine is said to have flowed in great quantities from the ears, eyes, stomach, breasts, navel, &c., and the fluids discharged were found to contain *urea*. The patient laboured under suppression of the catamenia, after the suppression of which a vicarious discharge of blood occurred every five or eight weeks, sometimes at the regular period. For the first two years there was a discharge of blood occasionally from the stomach and lungs; from the breasts, more frequently from the left; from the ears, oftener from the left; and from the navel and nose. From the nose and right ear it was mixed with nearly three fourths urine; from the left ear with an equal quantity of urine; from the stomach and lungs with the contents of the stomach and the secretions of the fauces; from the left breast and navel it was generally unmixed with any other fluid. It was frequently fetid; the colour always dark; sometimes coagulating, but not generally.—(*Am. Jour. Med. Sc.*, 1828.) A somewhat similar case has been related by the late Dr. C. Ticknor (*Am. Jour. Med. Sci.*, May, 1834), in which a female is reported to have suffered from discharges of urine, and of great quantities of sand and calculi from the mouth, rectum, nose, ear, side, and umbilicus; and these symptoms were accompanied with paralysis, tetanus, &c. We believe that hysterical ischuria is a not unfrequent occurrence in these cases, and is often overlooked by or concealed from the practitioner.

There is perhaps a want of the exercise of volition, which is said by Sir B. Brodie to occur in hysterical retention of urine; and it may arise from a suppression of the renal secretion, the quantity being too small to furnish the proper stimulus to the muscular structure of the bladder. There is reason to suppose that some of these remarkable cases of vicarious secretion of urine, sand, &c., were instances of hysterical imposture, or moral monomania, which leads its subject to delight in originating marvellous reports and practising deception merely for the pleasure it seems to give. This is one of those incomprehensible and mysterious phases of human nature which occasionally confounds all our reasonings, and which is far more curious than pleasing to contemplate. Hysterical *hæmorrhages*, as hæmatemesis, hæmoptysis, epistaxis, are also met with, which are often vicarious of the menstrual flux. Cough, dysphagia, vomiting, hiccough, and a host of other anomalous symptoms, may also occasionally be ranked under this disease for want of a better classification.—(See Laycock "*on Hysteria.*")]

40. IV. Hysteria in Males (!).—Numerous writers of great respectability have believed in the occurrence of hysteria in males during states of debility. I have never met with a case, however, in which the complaint was unequivocally developed; but I have seen several nervous affections in males of a susceptible and irritable temperament, weakened by disease, or by over-exertion, that have assumed some of the characters of hysteria, particularly in its irregular or undeveloped state. Cases of hypochondriasis and of melancholy in the male occasionally present somewhat of an hysterical character; thus I have met with an instance of hypochondriasis in a gentleman aged about forty, who complained of painful attacks of priapism, of a feeling of stricture about the throat, with shedding of tears, miserable depression of spirits, &c., and yet who could readily join in lively and amusing conversation. Such instances serve to show the relation existing between hysteria and hypochondriasis: a circumstance not less deserving attention than the distinctions between them. Of the facts adduced and alluded to by Sydenham, Hoffmann, Whytt, Ferriar, Villermay, Georget, and Conolly, favouring the opinion as to the occurrence of hysteria in males, the most conclusive is that recorded by Mr. Watson (*Edin. Med. and Surg.*

* [For reference to these cases, see *Am. Bib.* at the end of this article.]

Journ., vol. xi., p. 303). A strong man complained of giddiness and headache, and was seized with epileptic convulsions. After some hours the symptoms returned, with alternate laughing and crying, spasms about the throat, and inability to speak, although he was perfectly sensible. Dr. Trotter states (*Medicina Nautica*, vol. ii.) that hysteric fits occurred in some cases sent to hospital ships, and that they were attended "by violent convulsions, globus, dysphagia, immoderate risibility, weeping, and delirium." It is very possible that unaccustomed continence in the male may, in rare cases, and in the nervous temperament, give rise to seizures of an hysterical nature. I was consulted by a young gentleman, who complained of headache and several of the symptoms of hysteria, after prolonged periods of continence. I recommended him to marry; he adopted my advice. I saw him two or three years afterward, and he told me he had had no return of the complaint. A similar instance to that adduced by Dr. Conolly, and which arose from intense study, occurred to me some years since. I was recently consulted in the case of a young man of the nervous temperament, who had become early addicted to drunkenness, and who relinquished the habit under the guidance of his friends. Soon afterward, upon the occurrence of a domestic calamity, he was attacked by a nervous complaint, in which it was difficult to determine whether the hypochondriacal or hysterical character predominated.

41. V. Complicated Hysteria. — Hysteria may appear, in either its developed or irregular forms, in the course of numerous other diseases. It may occur at the crisis of, or during recovery from fever or inflammatory diseases; during the progress of, or in early convalescence from inflammations of the respiratory organs; or in the course of pulmonary consumption. It is sometimes complicated with asthma—*Hysterical Asthma*; and is very generally a symptom of, or associated with inflammations of the uterus or ovaria, particularly when these take place independently of the puerperal states. It frequently, also, attends leucorrhœa and structural lesions of these organs. Hysteria may occur during pregnancy; but it is oftener suspended by this state, as well as by lactation, although it sometimes appears a few weeks after delivery. Its frequent connexion with irritation of the spinal cord, with functional disorder of the heart, &c., has been already alluded to; and it is often associated with hypochondriasis. It is often, also, consequent upon derangements of the digestive organs, especially those in which the gastro-intestinal mucous surface is in a state of irritation. It is not infrequently connected with disorder of the urinary organs, the urinary secretion and excretion being affected in various ways besides that which more usually characterizes the hysteric seizure. When hysteria appears in the course of other maladies, it is generally owing to the temperament and constitution of the patient, and to debility or exhaustion of nervous power, from disease or from treatment. Hence its occurrence after excessive or inappropriate depletions, after hæmorrhages, after parturition, and after fevers.

42. When hysteria is complicated with these or other diseases, or when these affect hysterical females, a prolongation of disease, or farther complications, and a protraction of convalescence, are frequently produced. Dr. Conolly justly remarks that, in the course of a long hysterical disorder, and yet more readily in the course of fever in an hysterical patient, inflammatory action may take place at the origin of previously irritated nerves, or in the brain, or other organs; tenderness of the spine may become excessive; and disordered sensation and impaired power of motion may indicate the existence of something more than mere irritation. These symptoms may disappear as the patient gains strength; but they sometimes become more intense and constant, and assume a more serious form than the shifting, evanescent, or local tenderness and pain, affecting various parts as described above (◊ 14).

43. VI. Duration and Terminations. — *a*. The *duration* of the *paroxysm* of hysteria varies from a few minutes to many hours; but the continuance of the complaint is very uncertain. Hysteria may not again recur after a single seizure, especially if it have been induced by the more powerful causes; but this is seldom the case, for when it has once appeared, there is a predisposition to its return, in one or other of its various forms, upon the recurrence of any of the predisposing or exciting causes. Much, however, will depend upon the general health and circumstances of the patient. It may thus reappear after intervals of various duration; or it may hardly ever be completely absent, in some one or other of its numerous modes, during the greater part of the period between puberty, or the age of twenty, and the complete cessation of the catamenia. It seldom occurs, even in those subject to it, after this latter epoch; yet I have seen instances of it, induced by mental emotion, at a much later period of life. A very large proportion of the ailments of females during the period of uterine activity, however diversified their characters may be, are really hysterical. Hence many females enjoy much better health after this change has been quite completed than they did previously, although about the period of change their complaints are often aggravated.

44. *b*. The *terminations* of hysteria are, 1st. In a more or less complete restoration of health. 2d. In some other complaint, into which it may altogether merge and disappear, or with which it may become associated. It rarely or never terminates in death, unless from neglect or improper treatment.—(*a*) Restoration of health depends very much upon the attention paid during treatment to the removal of the causes, to the state of the general health, to the uterine functions, and to associated disorder.—(*b*) Hysteria may pass into epilepsy, or assume various convulsive forms. It may terminate in mania, and more rarely in confirmed insanity, or in mental imbecility. Females who have been subject to hysteria in the unmarried state, especially if it have assumed the fully developed or convulsive form, are more disposed than others to puerperal convulsions and to puerperal mania; although marriage sometimes entirely removes or ameliorates the complaint. It may also terminate in inflammation of the membranes of the brain, or of the spinal cord; but this does not occur so frequently as some suppose. It occasionally gives rise to inflammation of the

uterus, or of the ovaria; but in these cases the irritation or congestion of these parts, and disorder of the uterine functions, upon which the hysteria depended or was associated, are only more fully developed, or converted into the inflammatory state by it. Although it often deranges the functions of the heart and lungs, it seldom occasions serious diseases of these organs; but it often aggravates pre-existent disorder of them, as well as of the several digestive viscera.

45. VII. DIAGNOSIS.—It is generally easy to distinguish the more fully developed states of hysteria from other affections; yet this is occasionly very difficult; and it is particularly so to distinguish several of the more irregular forms of the complaint from those diseases which they so closely simulate. Of the *diagnosis* of these forms I have made sufficient mention in my descriptions of them.—*a*. Fully formed hysteria may be mistaken for *epilepsy*, and the mistake is the more likely to occur, as the former may pass into the latter, particularly when affecting plethoric persons, or when neglected; but it then usually assumes the uterine form of epilepsy. PINEL, VILLERMAY, and CONOLLY have properly insisted on the importance of forming a correct diagnosis between these two maladies, and especially of not imputing epilepsy to a female who is merely hysterical. "It is important to humanity, and to the peace and happiness of families," adds M. VILLERMAY "that these complaints should be correctly distinguished." Epilepsy is an hereditary disease, is incurable in the majority of instances, and generally weakens the intellects and the understanding—circumstances which cannot be imputed to hysteria. SYDENHAM, TISSOT, and VILLERMAY advise that not only should the symptoms and mode of attack in both be inquired into, but also the causes which occasioned the seizure; yet too much reliance should not be placed upon these in the formation of a diagnosis. The most frequent causes of *hysteria* are, the emotions of love and jealousy, voluntary or compelled continence, longings after ardently-desired objects, or unsated desire, disorders of menstruation, &c. (§ 54); those of *epilepsy*, on the other hand, are hereditary predisposition, fright, terror, &c. (see art. EPILEPSY, § 19–24).

46. In *epilepsy*, the seizure is sudden or instantaneous; the patient often utters a loud cry, falls violently to the ground, froths at the mouth, protrudes the tongue, which is generally injured by the teeth, and is altogether unconscious. The eyes are distorted, the muscles of the face violently convulsed, and the pupils are insensible to light. There are generally no precursory symptoms, and there is no sensation of globus hystericus. The epileptic attack terminates in sopor, or a heavy sleep, from which the patient awakens exhausted, complaining of headache and depression. In *hysteria*, on the other hand, the seizure is more gradual; is generally preceded or attended by the globus; neither frothing at the mouth, nor protrusion of the tongue, nor distortions of the face and eyes characterizing it. The hysteric patient retains her consciousness, or remembers what has passed during the paroxysm; and although she laughs and weeps alternately, the muscles of the face are not otherwise convulsed. At the termination of the fit there is often a tendency to sleep, or, rather, a desire to remain quiet; but there is no sopor or heavy sleep, unless in the comparatively rare form of hysterical coma. There are always borborygmi, pain in the left side, and a copious flow of urine. M. GEORGET attaches most importance to the absence of the precursory symptoms observed in hysteria, the complete loss of consciousness, and the distortion of the mouth, protrusion of the tongue, and state of the eyes, in determining the existence of epilepsy. When hysteria is about to pass into epilepsy, distortion of the eyes and of the muscles of the face is the surest indication of the transition; and when to this, frothing at the mouth, injury of the tongue, and complete loss of consciousness are added, the epileptic character is fully developed. Numerous other circumstances connected with the history of the case, and the occurrence of the attack, already stated in the description of both diseases, will assist the diagnosis. When a convulsive paroxysm occurs in males, there can be rarely any doubt as to its nature; but when it appears in females, an attentive inquiry into its peculiarities, and into the state of the uterine functions, is especially requisite; for, although it may be hysterical, it may pass into the epileptic form, or it may present a mixed character, but attention to the pathognomonic symptoms just stated will readily determine the nature of the seizure.

47. *b*. Although *hypochondriasis* and hysteria are distinct diseases, yet they frequently approximate each other, or are even associated in females; indeed, most hysterical females may be said to be hypochondriacal, especially if hysteria has become habitual or confirmed. Dr. CULLEN remarks that the two diseases have some symptoms in common, but they are, for the most part, considerably different. Spasmodic disorder is rare in the one, but frequent unto a great degree in the other. Persons liable to hysteria are sometimes affected at the same time with dyspepsia; they are often, however, entirely free from it; but this never happens to those subject to hypochondriasis. These complaints occur mostly in different temperaments, ages, and sexes; a circumstance requiring no illustration. The association of them in the female, and perhaps in rare instances in the male, as in the cases above alluded to (§ 40), is of too much importance to be overlooked. Considering how much the several parts of the body are connected, and how much the several functions depend upon each other, we cannot wonder that their morbid affections should often be mixed, or insensibly pass the one into the other; the effect of this is, indeed, that there are no universal distinctions, and that in a few cases only are there exact limits between analogous or similar diseases. Accurate observation and precise description do much in extricating us from this confusion; but in some cases, still, we must remain in doubt and in difficulty. Yet even in these it will matter but little as to what name we may use, so long as we recognise and estimate with accuracy the nature, extent, and relations of the morbid condition.*

* M. BRACHET, in distinguishing between hysteria and hypochondriasis, says that the former is a spasmodic affection of the cerebral nervous system, to which he has given the

[Dr. Ashwell has very judiciously directed the attention of the practitioner to the *hysteric diathesis*, as a knowledge of its existence serves as a most important guide in the treatment of female complaints. "It is difficult," says Dr. A., "exactly to describe the nature of a pervading hysteria, and yet there are few observant practitioners who do not ascertain and appreciate its existence. Its diagnosis may not admit of easy explanation, but a conviction of its presence rests on the mind. In such instances, pain, which would lead an ignorant physician to bleed and give mercury, suggests to one better informed the propriety of abstaining from both: if asked the grounds of his opinion, he will refer to a certain something pervading the whole series of symptoms very different from severe inflammation. The pain may be acute, the pulse quick, the skin hot, and the entire system highly excited, still it is evident that there is something associated with all these indications of a transient and functional kind; an affection, indeed, of the nervous system, irritability, and not inflammation. If he acts upon this conviction, and does not bleed and purge, but soothes and supports by narcotics and bland nourishment, the truth of his opinion becomes apparent, and the result proves that hysteria is very rarely either an active or dangerous malady." (Goddard's Am. Ed. of Ashwell on "*Diseases peculiar to Women*," Phil., 1845.)

But, although hysteria possesses such a truly proteiform character, simulating almost every disease to which the female constitution is ever exposed, we are not to forget to be constantly on our guard, lest we mistake diseases dependant on congestion, or on changes more decidedly organic, for hysteric or functional maladies only. We have known cases to be regarded and treated as hysterical which proved to be of the latter kind, requiring, of course, a directly opposite mode of treatment. Dr. Conolly has truly observed that any function may, in the hysterical constitution, be readily disordered, as the respiration, the circulation, the digestion of food; any part may be affected with pain, and the usual symptoms of confirmed disease, and, at length, the parts thus affected may really become the seat of inflammation or other disorder, and undergo a change of structure. This fact, so often noticed by every clinical observer, should teach every practitioner caution, and lead him to investigate this class of diseases with more than usual care and minuteness. It will be useful, in studying the diagnosis of hysteria, to bear in mind the following table of the parts, obviously under the dominion of the true spinal marrow, as given by Marshall Hall as affected in this multiform disease:

1. *The larynx:* imitation of croup; apparently imminent suffocation.
2. *The pharynx:* dysphagia.
3. *The respiratory organs:* dyspnœa, cough, hiccough, retching, vomiting, &c.
4. *The cervix vesicæ:* dysuria, retention.
5. *The muscular:* trismus, tetanus, contracted hand, distorted foot, &c. The rest relates to emotion, which is the "magna pars of hysteria."]

48. VIII. Causes.—i. *Predisposing.*—Hysteria may be said to be almost peculiar to the *female* sex; for the instances of its appearance in the male are so rare, and so problematical, as respects its fully developed and conclusive states, as hardly to be taken into account.—*a.* The *age* at which females are most liable to it is from fifteen to fifty; and especially from twenty to thirty, and again from forty-two to forty-eight. It sometimes does not occur until the latter epoch; but it rarely recurs at a later period of life. Hysteria is very seldom observed before puberty; but considering that menstruation commences in some cases, particularly in young ladies in boarding-schools, as early as the tenth and eleventh years, the appearance of this complaint, in some one or other of its forms equally early, cannot be a matter of surprise. *Temperament* and *diathesis* evidently predispose to hysteria; nervous, sanguineo-nervous, and irritable temperaments, and persons of a lax, weak, or delicate, impressible, and soft habit of body are most subject to it. As this state of constitution is derived from the parents, the opinion of Hoffmann, Frank, and others, as to its occasional dependance on hereditary predisposition, cannot be disputed. The children of debilitated, exhausted, or aged parents, and those who are of an impaired constitution, either originally or from early management and education, are most likely to be subject to this disorder. A plethoric *habit* of body, joined to relaxation or deficient tone, predisposes to the more developed or convulsive states; and a thin or spare habit, associated with delicacy of conformation and susceptibility of the nervous system, to the more irregular forms.

49. *b.* There is perhaps no other malady which depends so much as this upon the *management* of childhood, and on the moral and physical *education* of early life. A luxurious and delicate mode of living and of rearing; a neglect of whatever promotes the powers of the constitution, especially of suitable exercise in the open air, and of early hours as to sleeping and rising; an over-refined mode of education, and the excitement of the imagination and of the emotions, to the neglect of the intellectual powers and moral sentiments; too great devotion to music, and the perusal of exciting novels; the various means by which the feelings are awakened and acute sensibility is promoted, while every manifestation of either is carefully concealed; and studied endeavours to dissemble desires which struggle to be expressed, all serve, especially at a period when the powers of mind and the conformation of the body are approaching development, to produce that state of the nervous system of which hysteria is one of the most frequent indications. About the period of puberty in females, various circumstances connected with their education tend to weaken their constitution, to excite

name of *cerebral neurospasm* (*neurospasmie cérébrale*), and that the latter is a disorder, a vitiation, an aberration of the two nervous systems, which he denominates a *cerebro-ganglial neurotaxy* (*neurotaxie cérébro-ganglionaire*). Thence he infers that there can be no identity as to seat or affection between these two diseases; for the one is a spasmodic affection of the cerebral system only, and the other is an ataxy of the two nervous systems. He, moreover, states that there is no farther analogy between them than the participation of the cerebral nervous system in the two maladies; but that, in hypochondriasis, the ganglial system is equally compromised. Hence, 1st. They are not identical affections; 2d. They differ in their seat and nature; the phenomena in the one being spasmodic; in the other, vitiation of function.

their emotions and desires, and to cultivate their imaginative and more artificial faculties at the expense of their reasoning and moral powers. Whenever numbers associate previous to, or about the period of puberty, and especially where several use the same sleeping apartment, and are submitted to a luxurious and over-refined mode of education, some will manifest a precocious development of both mind and body; but in proportion to precocity will tone and energy be deficient, and susceptibility and sensibility increased. In these circumstances, also, organic sensibility, particularly as relates to the uterine system, often assumes a predominance powerfully predisposing to hysterical affections. There can be no question, although the subject has been but rarely approached by British medical writers, that indulgence in solitary vices and sexual excitements is not an infrequent cause of this, as well as of other disorders. Numerous writers have insisted upon the propriety of giving due consideration to this source of mischief, as well as to the ennui and chagrin attending celibacy and continence. I agree with Dr. Conolly in believing that English practitioners pay, perhaps, too little attention to these and other related circumstances; and that, in a country where the passions and emotions are so carefully suppressed or concealed, they sometimes seem to forget their silent operation on the frame, and charge the medical writers of other countries with being somewhat fanciful and extravagant.

50. *c.* Besides the above, there are various circumstances connected with the *social state* that tend to develop these conditions of the uterine organs and nervous system, in which hysterical disorder originates. M. Georget remarks that the progressive steps of life, as youth passes away, are sources of painful moral affections, especially to the frivolous, the vain, and the unmarried of the sex. These affections increase the susceptibility of the nervous system, and, with numerous other circumstances yet to be mentioned, dispose to the nervous disorders of the more advanced epochs of life. There can be no doubt that pampered modes of living; an early or habitual indulgence of temper, or of the emotions and desires; the use of wines and liquors, even within what may appear the bounds of moderation; late hours, and late rising; insufficient modes of exercise, or the want of it, and of pure air; neglect of the requisite exposure to light and sunshine; and sedentary occupations, particularly in over-heated and crowded apartments or factories, more or less predispose the female constitution to this affection. Some writers believe that the use of tea and coffee has a similar effect; it is possible that the former, especially green tea, taken too frequently or in excess, will weaken the nervous system, and that the latter will sometimes excite the uterine organs. The influence of *climate* is not very manifest; temperate and changeable regions certainly furnish more numerous instances of nervous disorder in females than very warm or very cold countries; but as much is probably owing to the state of *manners* and *society* in the former as to climate. Even *dress* has some effect in the production of hysteria; inordinate compression of the waist by stays not only weakens and displaces the digestive organs, but favours local determinations and congestions, and deranges the uterine functions.

51. *d. Previous disorder* more frequently predisposes to hysteria than other circumstances, for many of those already noticed induce other complaints before hysteria, in any of its forms, is manifested; and these complaints constitute merely that state of predisposition which only requires the occasion or exciting cause of its appearance. The various disorders of Menstruation (see that article), determination of blood to or congestion, or irritation of any of the uterine organs may exist, and yet no hysterical affection take place. The nervous system also, both ganglial and cerebro-spinal, may be susceptible and morbidly sensible, and yet none of the phenomena constituting hysteria may appear. These, as well as some other morbid states, frequently constitute only the predisposition, which, however, will readily burst into open disease when one or more of the exciting causes come into operation. Whatever exhausts organic nervous power will increase susceptibility and irritability, and thus constitute that mobility of the system, and disposition to local determinations and congestions, justly insisted upon by Dr. Cullen as being connected with the pathology of the complaint. The susceptibility arising from exhaustion by acute disease favours the appearance of hysteria, especially during early convalescence. The approach and presence of the catamenia have also some influence, both as a predisposing and an exciting cause.

52. *Gastro-intestinal disorder*, or irritation, has been justly viewed by numerous writers as a predisposing cause of hysteria, and particularly insisted upon by Broussais and his followers. Although this writer has doubtless exaggerated the influence of this morbid condition, and imputed to it phenomena depending chiefly on debility and augmented organic nervous sensibility, yet it is nevertheless often present, associated, however, with other morbid states, as those just named, and with impaired action and flatulent distention of the digestive canal. In some cases, also, the gastro-intestinal disorder is almost coeval with, and purely a complication of the hysterical affection. But it is much more frequently observed that numerous circumstances tending to disorder the digestive mucous surface, especially errors in diet, as respects both food and drink, and various symptoms indicating impaired or disordered digestion and fæcation, have preceded, for a longer or shorter period, the development of the hysterical disorder. Still, it must be admitted that the symptoms referred to the alimentary canal, especially impaired function, flatulent distention and borborygmi, and altered sensibility, are greater indications of debility of the organic nervous system than of inflammatory irritation of the gastro-intestinal mucous membrane. Nor should it be overlooked that disorder of the uterine organs, seated not merely in the nerves, but affecting also vascular action in these organs, may exist without exciting painful sensations, and yet sympathetically disturb the digestive canal. Thus we perceive the changes produced in the uterine system by impregnation displayed chiefly in the digestive organs and nervous system. Even the errors of diet, and the

desire for various improper or indigestible articles of food and drink, which has been attributed to disorder of the alimentary canal, may be actually occasioned by changes originating in the uterine organs. These substances, however, by increasing the disorder of the digestive tube, will aggravate or perpetuate the primary affection of the sexual organs. There can be no doubt, that whatever weakens organic nervous power, as all disorders of the gastro-intestinal viscera necessarily do, will both dispose to and increase hysterical complaints.

53. It has been supposed by some writers that the females of *gouty* parents are more prone than others to hysteria. This may be partly accounted for by deficiency of constitutional energy derived from the parent, and greater susceptibility of the nervous system, as well as by the circumstances alluded to above (§ 49).

54. ii. *Exciting Causes.*—Certain of the predisposing causes may of themselves occasion the complaint, when more than usually active, especially disorder of the uterine organs, or of the digestive canal. Excitement of the nerves of the uterus or ovaria, or irritation of them, particularly in connexion with any irregularity of menstruation; inflammatory action, of an acute, sub-acute, or chronic nature, of the vagina, or of these organs; congestion, structural lesion, tumours, polypi, &c., of the uteras, and leucorrhœa, not infrequently occasion hysteria. Although this disorder is very often connected with excitement, or even with inflammatory irritation in the ovaria, yet it is seldom symptomatic of fully developed ovarian dropsy. It is not improbable that this latter malady proceeds from a state of impaired tone, or is associated with a condition of the organic actions in these parts, incompatible with the production of the hysterical paroxysm. Irritation of the gastro-intestinal mucous membrane, by stimulating or acrid ingesta, particularly such as act upon the colon and rectum, as large doses of aloes, colocynth, &c.; morbid secretions, mucous sordes, and fæcal collections in the large bowels; the irritation of worms, especially of ascarides, in the rectum—the *Hysteria verminosa* of Sauvages; the use of stimulating or acrid glysters, and hæmorrhoids, sometimes excite one or other of the forms of the complaint. Excessive discharges and hæmorrhages, particularly prolonged leucorrhœa, diarrhœa, abortions, uterine hæmorrhage, and protracted suckling, on the one hand; and on the other, the suppression of discharges, as of the catamenia, of the lochia, and of leucorrhœa; long or extreme suffering from pain; mental or bodily fatigue; and even irritation of remote parts, as that connected with cutting the wisdom teeth, occasionally induce a seizure.

55. Mental affections and excitements, especially those which act upon the uterine system in particular, disappointments in love, unreturned and spurned affections, jealousy, anger, and other violent emotions; protracted expectation, longings after objects of desire, tragic representations, frights, the sight of objects disgusting or distressing, or disagreeable from peculiar mental diathesis, and intelligence of a distressing or of an exciting nature, suddenly communicated, are the most common occasions of hysteria, as respects both its first appearance and its subsequent recurrences. Several of these emotions affect the uterine organs, the affection being afterward reflected upon the nervous system generally. Premature or physically incongruous marriages; excited, but unsatisfied desires; celibacy, and veneris desiderium inane, are also not infrequent causes of the complaint. Frank remarks that "Cœlibem vitam plures sine noxâ ducere possunt fœminæ, sed vix unan illarum invenies, quæ prope maritum impotentem impune decumbere possit. Idem de uxoribus, a maritis neglectis, valet." There is no doubt that the sight of others in the fit will sometimes produce an hysterical seizure. I have myself witnessed this on two or three occasions, and in one of these, two females were attacked from this circumstance. This phenomenon has been imputed to imitation; but it may with equal propriety be assigned to sympathy, to fear, &c. Probably more than one of these feelings are concerned in producing it. Severe mental distresses, or extreme joy, may also occasion some one or other of the forms of the complaint. Immoderate fits of laughing produced by humorous or ridiculous occurrences, or crying caused by vexation or contrarieties, may also pass into the hysterical paroxysm.* I have no doubt of the fit being often renewed at pleasure, almost as readily as tears may be shed, by recalling or adverting to various feelings, emotions, or circumstances; and I have even seen instances which have convinced me of the fact. Electrical and warm states of the air, and sudden vicissitudes of temperature, have been supposed sufficient to produce a seizure. The influence of spirituous or vinous potations, of stimulating diuretics, and of substances which excite or irritate the urinary bladder in the production of the complaint, is much less doubtful than that of atmospheric temperature; but the close, warm, and impure air of crowded rooms and assemblies, particularly in connexion with excited feelings or contrarieties, very often occasions an attack, especially in those who have previously experienced it. A similar effect is, in rarer instances, produced by various odours, especially in peculiar idiosyncrasies. Highmore states that the fit has been often induced by the odour of musk.

56. IX. Pathology.—The nature of hysteria may be in a great measure inferred from what has already been stated respecting its symptoms and causes; yet something more explicit

* [The reader will not fail to call to mind, in connexion with this subject, the *dancing mania* described by Hecker, in his "*Epidemics of the Middle Ages*," an imitative hysterical disease which extended over the whole of Germany in 1734. The preaching of the celebrated John Wesley was frequently followed by convulsive movements in his hearers, and even by cataleptic and epileptic symptoms, &c. That hysterical laughter is not always confined to females, will appear from the following ludicrous description from Wesley's Journal: "Friday, 9th, 1740. I was a little surprised at some who were buffeted of Satan in an unusual manner by such a spirit of laughter as they could in no way resist, though it was pain and grief unto them. I could scarcely believe the account they gave me, had I not known the same thing ten or eleven years ago. Part of Sunday my brother and I then used to spend in walking in the meadows and singing psalms. But one day, just as we were beginning to sing, he burst out into loud laughter. I asked him if he was distracted, and began to be very angry, and presently after to laugh as loud as he. Nor could we possibly refrain, though we were ready to tear ourselves in pieces, but we were forced to go home without singing another line." Perhaps this incident may throw some light on the question whether males are ever subject to hysteria.]

still must be advanced on this subject. As simple and pure hysteria is rarely or almost never fatal, and as we therefore have hardly ever an opportunity of examining the state of the principal viscera of patients who had been subject to this complaint, unless they have died of some intercurrent or associated malady, so proofs have been wanting in support of any of the doctrines proposed as to its nature, and a very wide scope allowed for vague hypothesis. The ancients and many of the moderns referred hysteria to the womb, and hence the origin of the name. The ancients, however, ascribed properties, powers, functions, and motions to the uterus which modern knowledge has shown to be erroneous; yet I am disposed to believe that this organ, influenced as it most probably is by the nervous and vascular states of the ovaria, performs a very important part in the economy; and that this is not confined to alterations merely of its organic sensibility, but that it extends frequently to its contractility, and to several related organs.

[It may, perhaps, subserve other purposes than the gratification of curiosity to quote some of the opinions of ancient writers on the nature of this singular affection.

PAULUS ÆGINETA describes the disease under the term of "uterine suffocation," or the "hysterical convulsion," and says "it is a rising up of the uterus, affecting sympathetically the most important parts, as the carotid arteries, the heart, and the membranes of the brain." As the paroxysm subsides, he represents the uterus as gradually relaxing, "and thus they recover their understanding and senses. The disease comes on periodically like epilepsy, and is occasioned by the uterus being gorged, or from semen or some other matter having become putrid in it." He describes the disease as attacking most frequently in winter and autumn, "especially young women who are prone to venery, the barren particularly, if their sterility be brought on by medicines, and others of a cold nature." According to HIPPOCRATES, this complaint generally attacks antiquated virgins or young widows. "If the womb," he says, "ascend to the liver, the patient suddenly becomes speechless, her teeth are fixed, and her colour becomes pale." GALEN explains with great particularity how the uterus is retracted upward and to the sides by its ligaments in this complaint; and when it does take place, he says, there is a loss of sense and motion, a small, feeble pulse, and sometimes asphyxy. ARETEUS represents the uterus to be, as it were, an animal within an animal, wandering upward, downward, and to either side, being attracted by fragrant things, and flying from fetid; and that, when it ascends upward, it occasions compression of the liver, diaphragm, lungs, or heart, and sympathetically with the last, also, of the carotids, being accompanied with heaviness of the head and loss of sensibility. ACTEUS says the disease is occasioned by flatulent refrigeration; while PLATO says that the womb is an animal desirous of generation: if it become unfruitful for a long time, it turns indignant, and, wandering all over the body, stops the passages of the spirits and the respiration, and occasions the most extreme anxiety, and all sorts of diseases. (See ADAMS's *Com. in Paulus Ægineta*, SYDENHAM *Edition*. London, 1844.)]

57. Some recent writers have ascribed hysteria to irritation in the uterus, in the intestines, in the brain, or even in other internal viscera occurring in delicate, nervous, or susceptible persons. Dr. CONOLLY remarks that in all cases of hysteria there is a disordered state of some part, or the whole of the nervous system, and that, although this state may be, and very frequently is induced by uterine irritation, it no less evidently arises, in other cases, from causes productive of irritation in other parts of the body, and also from causes acting directly upon the mind. That more or less susceptibility, original or acquired, characterizes the state of the nervous system in hysterical persons will not be disputed; yet even in such persons, the usual exciting causes, or irritations of different viscera, will not occasion true hysterical symptoms unless they previously affect the state of organic nervous influence or of circulation in the sexual organs.

58. WILLIS ascribed hysteria to disorder of the brain, and M. GEORGET has recently adopted the same view, which has been most ably and satisfactorily overthrown by M. FOVILLE. Still more recently, Mr. TATE has contended that hysteria arises from a morbid state of the spinal cord, connected with disorder of the womb; but, as I have already remarked, this "morbid state" is but a vague generic term, and that, most probably, even when it is most prominent, more of altered sensibility than of vascular or structural lesion of this part of the nervous system constitutes its essence. However this may be, attentive observation of the morbid phenomena, especially at their commencement, will show that the spinal affection is merely a consecutive and contingent disorder, and one by no means generally, or even very frequently observed. This want of precision in the use of terms, and in the ideas relating to the pathology of hysteria, has been surpassed by M. ANDRAL, when he says, "As to my opinion respecting the seat of hysteria, I repeat that it is a nervous complaint, and that its seat is the nervous system!"

59. Although the uterus and its appendages have been viewed as the chief source of hysteria, both by the ancients and by most of the moderns, yet some difference of opinion exists as to the nature of this primary affection. PINEL, VILLERMAY, LOBSTEIN, and FOVILLE consider that it is entirely nervous, or is an excited state of the nerves supplying the organs of generation. Other writers, as ADDISON, &c., who have adopted the term uterine irritation, seem to ascribe to this term a similar meaning to that which the above authors have wished to convey; although they contend that, in connexion with this state, the uterine functions are very often disordered. M. PUJOL, on the other hand, infers the existence of chronic inflammatory action of the uterus as the immediate cause of the complaint. Inflammatory action in its various grades, from simple erethysm upward to the most acute vascular change, may sometimes be a complication or cause of hysteria; but there is no necessary dependance of the one upon the other; for we often meet with *metritis* without hysterical symptoms, and still more frequently with fully developed hysteria, without any evidence of metritis. Yet it should not be overlooked that

the former is often symptomatic of, or complicated with the latter.

60. When we consider the number and importance of the nerves of the female organs of generation, the connexions existing between them and the nerves supplying the kidneys, the urinary bladder, and the intestinal canal on the one hand, and the spinal and sacral nerves on the other; and the fact that these nerves are small and apparently few in girls, large and numerous during the epoch of uterine activity, and very small in old women, the sympathetic effects of irritation, excitement, or of erethysm of them will be more readily recognised, and the relation of these sympathies to their source made more obvious. Attentive observation of the causes of hysteria, and of their more immediate effects upon the generative system, and a knowledge of the sensations of the patient with reference to the origin and course of this ailment, will prove that the old opinion as to its source is correct. That the primary affection is seated in the nerves of the generative organs, and that it consists chiefly of excitement, erethysm, or irritation, sometimes, however, associated with congestion or vascular determination to the uterus, or with disorder of the catamenia, are shown by the circumstances in which it is observed, and the fact that it never appears until these nerves have approached their full development, nor after their principal functions have ceased. GEORGET, however, contends, in opposition to this opinion, that organic lesions of the uterine organs are very common in females who have never had hysteria; and that the more serious changes, as cancer uteri, uterine polypi, ovarian dropsy, &c., are seldom accompanied with this complaint. But the most of these maladies do not appear during the epoch in which hysteria is most common. As long as the uterine functions and sympathies are active hysteria will occur. Hence its not infrequent connexion with metritis and other uterine diseases during the prime of life; but when these functions and sympathies are exhausted or greatly enfeebled, as in most of the dangerous maladies and organic lesions of the uterus and ovaria, as well as in advanced life, hysteria will not be developed. The generative nerves have then become incapable of experiencing that state, and of exerting that influence upon the nerves related to them, which are requisite to the production of hysterical phenomena. As M. FOVILLE has justly observed, we do not find sexual ardour among the symptoms of malignant alterations of the testes, or of hydatids in the spermatic cord, &c. Hysteria does not occur in aged females, for the very same reason that menstruation and pregnancy do not take place in them. The belief that hysteria may affect males has been adduced against its uterine origin; but the fact of true or unequivocal hysteria having been met with in males needs farther confirmation, or, rather, the nervous affections, resembling some states of hysteria noticed in this sex, require a closer observation than they have hitherto received. I will not, however, deny, that irritation of the male sexual organs will not occasionally produce disorder in many respects similar to that observed in females in like circumstances, particularly in susceptible and nervous persons.

61. My views, therefore, as to the *pathology of hysteria* are as follows: *a.* That hysteria arises from the state of the organic nervous influence endowing the generative organs of the female, and that a similar state of the sexual organs of the male very rarely occasions it, and then only in peculiar circumstances; *b.* That this state of nervous influence nearly approaches to, or consists of excitement, nervous erethysm or irritation, or is of an active or sthenic kind, as respects the functions of these organs; *c.* That this is generally attended by vital turgescence of the vessels of the uterine system; and these states, consequently, occur chiefly during the prime of life, or while the nerves of generation and the uterine circulation possess their functional energies; *d.* That these conditions of nervous influence and circulation in these organs are generally insufficient of themselves to occasion the fully developed complaint; and that, in addition, there are increased sensibility and irritability of the sentient and motive systems, and, consequently, augmented susceptibility of impressions, from mental or physical causes, arising either from original conformation or from acquired habit or diathesis; *e.* That when these states of the generative organs are excited by mental emotions or by other circumstances, the affection is propagated by direct or immediate sympathy—by the organic nerves—to the digestive tube and urinary organs on the one hand, and to the cerebro-spinal nervous system on the other; and thus the phenomena constituting the hysterical seizure are developed; *f.* That the hysterical phenomena, proceeding from *direct sympathy* with the uterine organs, consist chiefly of those referred to the bowels — the borborygmi, globus, &c., and to the urinary organs, as the increased secretion of urine, &c.; *g.* That the extension of the disorder of the uterine nerves, by means of the ganglial system and its communicating branches to the roots of the spinal nerves, gives rise to the symptoms depending upon *reflex sympathy*,* especially the convulsions, pains, &c., and the affections of the respiratory organs, throat, head, &c.; *h.* That the phenomena of the developed states of the disease and of its irregular forms are principally sympathetic, and of the kind which I was the first to denominate the *reflex* (see *Notes and Appendix to* RICHERAND'S *Elements of Physiology*, p. 34 and 546); and the same views and pathological explanations given in the articles CHOREA AND RELATED AFFECTIONS (§ 15–17), CONVULSIONS (§ 46), EPILEPSY (§ 51), apply to the different varieties of HYSTERIA; *i.* That, although hysteria is often connected with deficient or irregular menstruation, yet this function is sometimes excessive, or is occasionally regular, in every respect, in hysterical persons.

[Dr. S. JACKSON regards the brain, or, rather, the medulla oblongata, as the seat of hysteria,

* In my APPENDIX to M. RICHERAND'S *Elements of Physiology*, published in 1824 and in 1829, I have divided the sympathies into, 1st. The *Reflex*, or those which take place in consequence of irritations conveyed by the nerves to the cerebro-spinal centres, and thence reflected upon motive or sentient parts; and, 2dly. The *Direct*, or those which proceed more immediately from the seat of primary excitement to other parts, by means chiefly of nervous communication, continuity of membrane, structure, &c. These views as to sympathy, which are certainly original, were applied to the explanation of the pathology of CHOREA, and its related disorders of CONVULSIONS, EPILEPSY, &c.

and thinks that those who are subject to frequent attacks of hysteria have this portion of cerebral structure in a permanent state of irritation of feeble grade, and which is increased by any sudden and strong impression, an unexpected noise, sight, or intelligence, becoming in them an exciting cause of the hysteric paroxysm. He supposes that the stomach and uterus are the organs from which the irritation that causes the paroxysms most frequently proceeds, and is most commonly transmitted through the great sympathetic, which anastomoses with the par vagum that has its origin in the medulla oblongata. Hence the varieties observable in the disease will depend, 1st. On the intensity and extent of the cerebral irritation; 2d. On the local visceral irritation by which it is excited; 3d. The organ that is the seat of the primary irritation.—(*Treatise on Diseases of Females*, by W. P. Dewees. Phil., 1833, p. 550.)]

62. X. Treatment.—There are few diseases less under the control of medical treatment than hysteria; and various circumstances connected with it often occur to render the management of it not only unsatisfactory, but also unpleasant. Patients themselves, or their friends, readily suppose that relief should quickly follow a recourse to medicine, and conclude that the proper means have not been employed when relief is not obtained. They do not consider—and the fact is generally not sufficiently explained in the proper quarter and at the proper time—that the complaint arises from causes which are mostly permanent in their action, or which continue during the treatment, and that in every case the difficulty of removing an effect, while the causes are in operation, is very great. The candid physician also readily admits that the complaint in its various forms is devoid of danger, and this circumstance is believed by many to imply a speedy cure. Several varieties of it, also, are calculated to excite alarm; and, if they be not soon removed, the knowledge or ability of the physician under whose care they may have come is impeached; and some other advice is asked, and often in quarters noted neither for honesty nor ability. If the patient should thus fall into the hands of either the qualified or the unqualified charlatan, the complaint is misrepresented or exaggerated, and alarm is excited. The effect, however, is often beneficial, although it was as little intended as its source was unsuspected. The impression of fear on the mind may put a stop to some of the causes, or may interrupt the succession of morbid sympathies. The patient, moreover, after she has passed from the care of the scientific practitioner, may be subjected to influences of a powerful nature, moral or physical, or both, and experience temporary or some permanent advantages from them; but from whatever source they proceed, or by whomsoever administered — whether by the medical empiric or by the spiritual comforter, the modern worker of miracles — the results are often equally annoying to the duly qualified practitioner. The regular professor of medicine is expected to administer benefit in all cases, and without regard to circumstances. If he fail, and the patient, under very different circumstances and influenced by very different feelings, receive benefit from the manipulations of a charlatan, whose means are more striking or imposing, or more suited to the moral condition of the patient than those previously employed, the occurrence is made a matter of notoriety, and equally to the disadvantage of the one as to the credit of the other. The former is expected by the public to cure, and it is considered discreditable for him to fail; the latter is viewed as having made a wonderful discovery if he succeed but in a single case, and his knowledge is supposed to have come by inspiration, as it could not have been derived from any other source. Another circumstance farther serves to counteract the treatment advised by scientific men, particularly in large towns. The patient is capricious, and her friends are often equally unstable. If benefit is not received in a very short time, the advice of some one else is obtained, and before he can be of any service he also is dismissed, and a third is called in. Thus, from twenty to thirty practitioners may be consulted without one of them having had a sufficient opportunity of fulfilling a single intention of cure. Now what is the consequence? The patient resorts to some noted or fashionable empiric, who is informed of her long sufferings, and the want of success of the greatest physicians in her case. He is shrewd enough to see at once the state of matters, and to turn them both to his pecuniary advantage and to his credit. He exaggerates the risk, the difficulty, and the consequences of the disease; refuses to undertake the case unless at his own terms, which he takes care to secure; and he thus also secures the continuance of the patient under his care, and even her confidence, although he should fail in all beside.

63. From the dishonest acts of charlatans useful lessons may, however, be honestly learned. When a physician is called to a nervous patient who has been under the care of other physicians, instead of prescribing at once, and without reference to this circumstance, he should acquaint her or her friends that probably a sufficient opportunity of affording relief had not been allowed to those who had preceded him; that, as a member of an honourable profession, he expects to be honourably dealt with, and that he will not compromise his reputation by prescribing for the case unless he be allowed time and opportunity—fully and circumstantially—for its proper treatment. Unless these be conceded, and in a spirit which will promise to secure their due performance, it will be infinitely better to relinquish the case altogether than to enter upon the treatment of it with the probability of disappointment. When it is found that the physician thus regards his own reputation, respect and confidence will be accorded to him by the patient and her friends.

64. There are various circumstances in the pathology of hysteria which require strict attention in the treatment. 1st. The particular form of the hysterical seizure, whether regular, irregular, or anomalous; 2d. The condition of the nervous system, particularly with reference to increased sensibility and irritability; 3d. The excitement, erethysm, vital turgescence, or other disorder of the uterine system, and their influence by *direct* and *reflex sympathy*; 4th. The states of the vascular system in connexion with

these, especially in respect of *plethora*, general or local, or of deficiency of blood; and, 5th. The functional or other disorder of the digestive canal. Of all these, the most important is the state of uterine function; for unless the symptoms connected with the generative organs be carefully ascertained, as far as is proper to inquire, and the disorder in this quarter be carefully inferred, the treatment will often be unsuccessful; and, even with the utmost exercise of professional acumen, we may fail, more or less, owing to the permanence of the moral and physical causes of the complaint.

65. i. Treatment in the Seizure.—*A.* If the paroxysm be attended by severe *convulsions*, the principal intention is, *to preserve the patient from injuring herself*; the next is, *to shorten its duration*.—*a.* Although her struggles are severe, she generally retains sufficient consciousness, and even volition, to avoid danger. Therefore little effort should be made to restrain them, and especially as they have, upon the whole, a beneficial effect, particularly in equalizing the circulation. If, however, the fit assumes an epileptic character, this object should be carefully attended to, and a folded napkin placed between the teeth, if it be required. In all cases, the patient should be removed to an airy apartment, and the clothes loosened around the waist, chest, and neck.—*b.* In order to *shorten the fit*, various means have been recommended, and found more or less serviceable. If the patient is able to swallow fluids, a large cupful of *cold or iced water* may be given and repeated. If the seizure be more severe, or be attended by general or cerebral plethora, the *affusion of cold water* on the head and neck should be resorted to, or cloths wet with it, or with an evaporating lotion, should be placed around the head. If the severity of the spasms, particularly of the muscles of the face and jaws, and of the strangulating sensation arising from the globus, prevents deglutition, *enemata* will be found of great service. The substances which I have found most efficacious, when thus employed, are, the spirits of *turpentine* alone, or with castor or olive oil, *asafœtida*, and *camphor*. An enema of the coldest spring water also puts an instant stop to the convulsions. The spirit of turpentine was recommended by me in 1821 (*Med. and Phys. Journ.*, vol. xlvi., p. 107, 185) in these cases. From half an ounce to an ounce and a half of it may be thus administered, with either of the oils just named, in any vehicle, as gruel, milk, broth, &c. As the patient's consciousness is seldom lost in the seizure, the influence of fear in arresting it has been often resorted to, and frequently with complete success. Even mention of the affusion of cold water has put a stop to the fit. Yet instances have occurred in timid persons of great nervous susceptibility where fear has aggravated the convulsions.

66. *B.* Where there is neither cerebral plethora nor difficult deglutition, the internal use of *diffusible stimulants*, as the preparations of *æther*, of *ammonia*, of *valerian*, of *asafœtida*, &c., have been very generally recommended, and are often useful, combined, according to circumstances, with one another, or with *anodynes*, as *laudanum*, *henbane*, *hydrocyanic acid*, &c.; the smoke of burned feathers, and the odour of asafœtida, of mint, of the volatile alkali, of aromatic vinegar, &c., are the common domestic means for the removal and prevention of a seizure. Much, however, particularly as respects the *prevention* of the fit, depends upon the patient herself. Most females subject to the complaint give way to the current of their feelings until the paroxysm is developed, although a determined resolution to prevent or suppress it would often prove successful. Diffusible stimulants are not so generally useful in preventing as in shortening the attack. The former of these objects is more certainly attained by a draught of cold water, or by an enema of the same, or by cold applications to the head, than by other means. Dr. Conolly states that he has found half a drachm of ipecacuanha prevent the seizure. Any of the other substances already recommended to be used in enemata for the purpose of shortening the fit will generally also prevent it.

67. *C.* The more severe or alarming states of the fit, as the comatose, the cataleptic, &c., are most benefited by the affusion of cold water on the head, or by the application of cold lotions in this quarter. Vascular *depletions* are seldom necessary during the fit, even in these cases, unless the attack has followed the suppression of accustomed discharges; or the temperature of the head and the action of the carotids show the propriety of prescribing them, and even then a moderate blood-letting, or cupping on the nape of the neck, will be sufficient. Warm and rubefacient *pediluvia*, and other *derivatives* from the head, may also be employed in these cases. The means which may be farther resorted to will be stated hereafter (§ 71, 75, 97).

68. ii. General Treatment, particularly in the Intervals.—*A. With reference to the state of the uterine system.*—The female organs of generation may be subject to that state of excitement, erethysm, turgescence, or irritation which, in susceptible and nervous persons, seems intimately connected with hysteria, without the catamenia being in any way disordered. More commonly, however, this discharge is scanty, difficult, painful, or irregular as to time, quantity, and character. In a few instances it is suppressed, or nearly so; in others it takes place at intervals of two or three months; in some it is too profuse, or much too frequent, and in many it is pale and branniform, or it presents appearances more fully described in the article Menstruation. But all these states are usually accompanied by more or less of altered sensibility, referrible to the uterus or ovaria: there is often pain behind or above the pubis, in the lower part of the sacrum, or in the loins, or in the hips or tops of the thighs; the excretion of urine is disturbed, or too frequent, or attended by slight scalding, &c.; and there is sometimes leucorrhœa, with tenderness of the os uteri on examination, and occasionally an unpleasant sense of heat in the vagina. All these indicate the propriety of having recourse to local depletions; yet, unless the patient be plethoric, or the discharge has been scanty or suppressed, a very copious vascular depletion is often injurious. A moderate *cupping* on the sacrum, or the application of ten or twelve *leeches* to the groins, two or three days before the expected return of each monthly evacuation, or to the hypogastrium, will gen-

erally suffice. If the depletion be more liberal, the employment of tonics and of other means to improve the general health must not be neglected.

69. All the symptoms just noticed as indicating irritation of the uterus are often present, even in the severest form, where there is great constitutional debility, and, in a few instances, where the colour of the surface and of the lips, and the states of the pulse and of the veins, indicate more or less anæmia. In these even local depletions may be hurtful. The chief dependance must therefore be placed in preventing local excitement or irritation, in the use of cooling *tonics*, sometimes in conjunction with *anodynes* and *sedatives*, and in improving the digestive functions and general health by suitable diet and regimen. The *sulphates of iron*, of *zinc*, and of *quinine*, are severally of use, in combination with small doses of *camphor*, or of *ipecacuanha*, and with *extract of henbane*, or of *hop*. If these should occasion headache, or increase the tenderness in the vicinity of the uterus, the *infusion* or *decoction of cinchona*, or the *infusion of valerian* with *nitrate of potash*, or *hydrochlorate of ammonia*, or carbonate of *soda*, may be prescribed. When the bowels require to be opened, the *cooling aperients*, as the bitartrate of potash, with the nitrate, and the confection of senna, should be preferred. Moral and physical *quietude*, frequent reclining on a couch, and a digestible and cooling diet, ought also to be enforced. In more plethoric persons these means are still more requisite than in the preceding; and, instead of chalybeates and tonics, *cooling diaphoretics*, particularly weak camphor mixture, with solution of the acetate of ammonia, nitrate of potash, and spirits of nitric æther, will be often taken with benefit. Wherever uterine turgescence or erethysm is inferred, the treatment must be directed with reference to the states of general or local plethora, and of nervous power, as hereafter insisted upon; and hot spices, exciting articles of food, and stimulating beverages, should be avoided. Heating purgatives and irritating injections ought not to be employed. A separate sleeping apartment should be suggested.

70. When the catamenia are disordered, the treatment should be directed with strict reference to the state of disorder, as explained in the article Menstruation. If they be *excessive* or *too frequent*, *tonics* and *astringents*, with *refrigerants*, and *anodynes* or *narcotics*, are generally requisite; but the predominant use of either of these classes of remedies should depend upon the peculiarities of the case. In these cases, especially, advantage will accrue from *cold sponging* the loins, abdomen, and hips every morning with an *astringent lotion*, as with equal parts of rose-water, solution of the acetate of ammonia, and vinegar; from the occasional recourse to an *enema of cold water*, particularly when a seizure is threatened, or to *emollient* and *anodyne enemata* on other occasions; and from rest in the horizontal posture. The *cold plunge* or *salt-water bath*, or *shower bath*, will often, also, be of service. In the other states of disordered menstruation, the treatment should be directed according to the principles stated above (§ 68, 69).

71. *B. With reference to the state of nervous susceptibility and tone.*—The increased susceptibility of the nervous system generally characteristic of hysteria is frequently associated with more or less debility, and increased irritability of the moving fibre, or, in other words, with mobility of the muscular system; and to this state, whatever may be other morbid conditions, should the treatment be in some measure directed. Yet the means which are the best calculated to correct this state are by no means obvious; for if it be associated with vascular turgescence of the uterine system, or with general plethora, antispasmodics, chalybeates, and other heating tonics may increase the complaint, although they will generally be of service in an opposite state of the vascular system. In general, therefore, the condition of the sensibility and irritability should be combated chiefly by frequent and *regular exercise* in the open air, by *early rising*, by sleeping in large, airy apartments, by cold or *salt-water bathing* or the *shower bath*, by cold sponging the surface of the body, by a proper conduct and employment of the mind, and by a correct management of the passions.

72. Dr. Cullen very justly remarks that *tonics* may be of service when the disease depends upon general debility; but as a plethoric state, especially of the uterus, is more or less joined with hysteria, the frequent or long-continued use of them may do harm. They should be confined to cases of pure mobility, particularly with a periodical recurrence of the seizure; and then the selection of them ought to be determined by the peculiarities of the case. In many such, the preparations of *cinchona* or of *valerian*, with the nitrate of potash, or carbonate of soda; the sulphate of *quinine* or of *zinc*, with small doses of *camphor*; the infusion of *bark*, or of *roses*, with one of the *mineral acids*, and the tincture of the *sesquichloride of iron*, will be most serviceable. In some cases, the addition to either of these medicines of an *antispasmodic*, as of the compound spirit of *sulphuric æther*, the *tincture* of *valerian*, &c.; and of an *anodyne*, as henbane, hydrocyanic acid, &c., according to the other substances selected, will be farther advantageous. When hysteria affects plethoric habits, and is connected with manifest signs of turgescence of the generative organs, *opium* is injurious. But in other circumstances it is often of service, particularly when conjoined with camphor, aromatics, or with some of the substances just named, but even then it should only be occasionally employed. When narcotics have not been previously resorted to, the preparations of *hop* will be found useful, if general plethora be not present.

73. *C. With reference to the states of the vascular system.*—The connexion of hysteria with vascular plethora, general or local, is often obvious, and has been very judiciously viewed by Dr. Cullen. The usual practice of removing this state by *blood-letting*, he remarks, is often precarious; for sometimes, instead of preventing, it will indirectly induce or increase vascular fulness. Besides, if depletion be carried too far, the complaint may be thereby increased. "Venæsection, therefore, may either increase the plethora or induce inanition; and it is only to be used in recent cases, and where there is manifestly a full habit." A *spare diet*

and *regular exercise*, particularly in the open air and in the light of day, *early rising*, and *cooling aperients*, are the means upon which the chief reliance ought to be placed in removing this state, and especially as they tend also to strengthen the nervous system, and prevent local turgescence and irritation. The frequent association, also, of dyspepsia, and of gastro-intestinal disorder with hysteria, renders this regimen still more necessary. When depletion, however, is indicated by the turgescence, or chronic inflammatory state of the uterine organs, or by impaired or obstructed menstruation, it should be practised in the manner already advised (◊ 68).

74. When the vascular system is deficient, rather than too full of blood, and when this fluid seems thin or poor (the *Hysteria chlorotica* of Sauvages), then *tonics*, especially the *preparations of iron* and *chalybeate mineral springs*, will be most beneficial; but they should be aided by air and exercise, and the other means already advised for improving nervous energy (◊ 71). The sulphate of iron with the extract of hop, or with the compound galbanum, or with the compound aloetic pill, according to the states of the bowels and of the catamenia; the compound mixture of iron, &c.; and a moderately nutritious or milk diet, will be eminently beneficial in these cases. If the patient complain of weakness in the loins and limbs, a large *plaster* of the red oxyde of iron, or the aromatic plaster, should be worn on the lumbar region, in addition to the employment of the other means already recommended.

75. *D. With reference to the state of the digestive organs.*—Irritation of the digestive mucous surface, in connexion with hysteria (◊ 52), is often most successfully treated by a mild, spare diet and moderate exercise in the open air. If the patient be plethoric, or complains of pain or soreness, or of tenderness in the epigastrium, abdomen, or hypogastrium, *local depletions*, particularly the application of leeches on the abdomen, and *cooling diaphoretics*, with external *derivatives*, will be appropriate, as respects both the digestive and the hysterical disorder. If the bowels be costive, the *cooling aperients* (F. 96, 790), or the preparations of *rhubarb* with *ipecacuanha*, *calcined magnesia*, or *castor oil*, will be useful. If they be relaxed, the *hydrargyrum cum creta*, with *rhubarb* and *ipecacuanha*, or this last with the *extract of hop*, or of *poppy*; and *refrigerants*, conjoined with *demulcents*, will be serviceable. In cases of *hysterical colic*, and of irregularity of the bowels in hysterical persons, a frequent recourse to *enemata*—to those consisting of cold or of emollient fluids, and sometimes of cooling aperients—will generally prove of great benefit. When the catamenia are at the same time disordered, clysters containing the spirit of turpentine are frequently very useful. The state of the digestive organs often requires *tonics* and *stomachics*; but these remedies may prove too stimulating, unless they be given with *refrigerants* and *antacids*, as with the nitrate of potash, and the carbonate of soda. Aloetic and heating or acrid purgatives, particularly those which excite the rectum and large bowels, are sometimes injurious. The propriety of exhibiting them, even when hysteria is associated with scanty or obstructed catamenia, is occasionally even doubtful, particularly when general or local plethora or excitement is present, unless these have been removed by suitable depletions; and then the *compound decoction of aloes*, with a little of the solution of potash, may be preferred. When flatulence is distressing, as it often is, the treatment should altogether depend upon its connexion with gastro-intestinal irritation, or with uterine excitement or turgescence. In the former case, the means just stated should be prescribed, aided by the application of a *large rubefacient plaster*, or the compound galbanum or pitch plaster, on the stomach or abdomen. Mint water, with calcined magnesia, and an aromatic or carminative, or the infusion of *calumba* or of *chyrita*, with the carbonate of soda and compound tincture of cardamoms, will generally also be serviceable.

76. iii. Treatment of the Irregular and Complicated States.—The *intentions of cure* in these states of hysteria are, 1st. *To remove existing disorder in the uterine and digestive organs, or in the cerebro-spinal centres*; 2dly. *To allay the local affection by means appropriate to its peculiar characters*; and, 3dly. *To make a forcible impression, mentally and physically, on the nervous system*, so as to allay the primary nervous affection, and to break the chain of nervous sympathy. These intentions are severally more or less applicable to all the nervous states about to be noticed; but a great difference will be shown to exist in the modes or means of their fulfilment, and in the dependance to be placed upon them individually.

77. *A. The painful affections depending upon this complaint*, or arising from irritation or turgescence of the uterine organs, influencing sympathetically (◊ 13) related or distant parts, require means, in some cases at least, different from, or additional to those already mentioned. —*a.* The treatment of *Hysterical headache* is fully stated in the article Headache (◊ 40).

78. *b. Pain in the left side of the thorax, simulating pleuritis*, or *pericarditis* (◊ 15), is difficult to remove, especially if there be tenderness in the dorsal portion of the spine, and disorder of the uterine functions. If the catamenia are scanty, and especially if there be more or less vascular plethora, cupping on the loins or sacrum, or the repeated application of leeches to the loins, and cooling or mild purgatives, will be necessary. In other circumstances, and in such cases, after these means have been employed, the effects of *antispasmodics* and of *narcotics* may be tried, especially of camphor or ammonia, with valerian or asafœtida and henbane, &c. If the pain be attended by *palpitations of the heart*, &c., the decoction of senega may be prescribed with mint or orange-flower water, carbonate of soda, and tincture of henbane; or camphor may be given in a mucilaginous mixture with hydrocyanic acid. Immediate relief is often obtained by applying on the pained part a piece of flannel wrung out of hot water, and sprinkled with spirit of turpentine, or with the following liniment:

No. 261. ℞ Linimenti Camphoræ Comp., Linimenti Terebinthinæ Comp., ää ʒj.; Olei Cajuputi et Olei Limonis, ää ʒj. M. Fiat Linimentum vel Embrocatio.

These embrocations should be covered by a dry cloth, or by wash-leather, to prevent evaporation, and be kept applied to the affected part until they occasion redness and burning heat of

the integuments. I have seen the pain removed also by the inner bark of the mezereon, previously moistened and softened, and kept applied to the part until a superficial sore was produced. If pain or tenderness in the spine be also complained of, the means about to be noticed (§ 85, 86) may be prescribed.

79. *c. Hysterical pain in the regions of the stomach and spleen* (§ 17) often resists medicine, and disappears spontaneously, especially after marriage, or from changes in the states of the uterine system. It is sometimes relieved by camphor, conjoined with hydrocyanic acid or with the acetate of morphia, or by the other antispasmodics and anodynes mentioned above (§ 78). The warm epithem and embrocation just recommended has, however, proved most successful in my practice. Large doses of the subcarbonate of soda, with a carminative mixture or spirit, and tincture of henbane or of opium, often afford relief. An enema, containing either the spirit of turpentine and castor oil, or asafœtida and confection of rue, generally proves very serviceable.

80. *d. When pain is severe in the region of the descending colon and left iliac region* (§ 18), or in *other parts of the abdomen*, with flatulent distention, increased sensibility, and other symptoms resembling *peritonitis* (§ 21), the above treatment is mere to be depended upon than any other. The warm epithem or embrocation should never be omitted. The enema just prescribed will seldom fail of emptying the large bowels, and of expelling the flatus, which is a chief cause of the more painful symptoms. When the complaint assumes the form of *hysterical colic*, the bowels being costive, these means are usually eminently successful. They may require, however, to be repeated. If palpitations be present in these cases, they depend upon, or are aggravated by the flatus, which often rises up into the œsophagus, and, by distending a portion of this canal, embarrasses the auricles of the heart. Hence the benefit which results from the means which are most efficacious in expelling the flatus, particularly from those just named; and from calcined magnesia, prescribed with antispasmodics and carminatives, or warm purgative tinctures. *For pain in the region of the liver* (§ 30) the treatment here advised will be appropriate. In all these states of the complaint, the bowels should be kept moderately open by mild or stomachic purgatives.

81. *e. When pain is seated behind, or just above the pubis* (§ 20), and particularly when it extends to the sacrum, to the os coccygis, or when it implicates the urinary bladder, or its functions, irritation, or vascular turgescence, or congestion of the uterus may be inferred. Local depletions ought then to precede other means; and the mode, amount, or repetition of depletion should depend entirely on the habit of body of the patient, and the state of the catamenia. After these have been prescribed, the bowels must be evacuated by mild or stomachic purgatives, and the circulation equalized by cooling diaphoretics and anodynes. Camphor mixture, almond emulsion, solution of acetate of ammonia with nitrate of potash, spirits of nitric æther and tincture of henbane, are generally useful in these cases. But if the pain still continue, the external means above advised, and the enemata (§ 78, 79), should be resorted to.

82. *f. Pain in one or both mammæ* (§ 29) is sympathetic of irritation or turgescence of the uterus or the ovaria; but it is sometimes associated with tenderness of one or two of the dorsal vertebræ. It is often removed by the treatment now prescribed. If there be scanty menstruation, leeches may be applied to the mammæ; but the tops of the thighs and hypogastrium are preferable situations. I have found cooling diaphoretics with narcotics, as the solution of the acetate of ammonia, and camphor julep, with the acetate of morphia and an aromatic spirit, very serviceable in this state of disorder. In a case of this kind, where there were remarkable tenderness and hardness of the left mamma, evidently depending upon uterine irritation and turgescence, and for which I was consulted by another practitioner, complete recovery followed a short course of the solution of the iodide of potassium in camphor mixture, to which the solution of potash and henbane were added. If tenderness exist in any of the dorsal vertebræ, the treatment advised for this complication (§ 85) should also be pursued.

83. *g. In the more acutely painful or neuralgic affections* connected with uterine disorder, the effect of a plaster, with the extract of belladonna and camphor, may be tried. But when they are associated, as sometimes observed, with pain or tenderness in some portion of the spine, then the other local means about to be noticed may be also employed. I have seen the most marked benefit result, in these more acute cases, from half an ounce each of spirits of turpentine and castor oil, taken on the surface of milk, and repeated once or twice after the intervals of a day or two; or from a full dose of the former medicine, followed by the enema already mentioned (§ 79), or by any suitable purgative. Repeated doses of turpentine, until either the kidneys are affected, or the bowels are entirely evacuated, and enemata containing a considerable quantity of this substance, will be found the most efficacious, when painful affections, connected with hysteria, are seated in, or extend to the lower extremities.

84. *h. Pain in the region of the kidneys, and in the course of the ureters* (§ 22), is evidently an extension of irritation from the uterus to these organs by direct sympathy, a considerable portion of the nerves of the generative and urinary organs belonging to the same ganglia. The treatment should, therefore, be chiefly directed to the state of the uterine system. Local depletions will sometimes be requisite, especially if there are general or local plethora, and scanty menstruation. The fixed alkalies or the alkaline subcarbonates, with anodynes and the spirits of nitric æther or the compound spirits of juniper, will occasionally be of service, especially when the urine deposites a sediment of uric acid in the form of sand. When the urine is higher coloured, or deposites a pink or amorphous sediment, consisting chiefly of the lithate of ammonia, the infusion or decoction of cinchona with hydrochloric acid, or the balsams, taken in the form of pills, with magnesia, will be found beneficial. The digestive functions should receive due attention. A rubefacient, stimulating, or roborant plaster applied on the

loins, as the aromatic, cummin, pitch, or ammoniacum plaster, will often also afford some relief.

85. *i. Pain in the spine* (§ 23) is rather a complication than a form of hysteria, and is not to be viewed as altogether, or always, depending upon inflammatory action or irritation; but rather upon excited sensibility. There is no doubt that vascular excitement or congestion often exists in these cases, especially where there is much tenderness or prominence of one, two, or more of the spinal processes, or puffiness around them. In these cases, especially, there is more or less continued disorder of the uterine, or of the digestive, or of the respiratory functions, or even of all of these, according to the seat and extent of the spinal affection; and occasionally the cerebral circulation becomes also deranged. To this affection, DARWELL, TEALE, TATE, BROWN, and GRIFFIN have directed particular attention, under the name of *Spinal Irritation*, or, more properly, irritation of the spine, and have recommended for it local depletions and external irritants, &c. But whoever confides in these alone, or even principally, will find himself disappointed in many, if not in the majority of cases. They often, however, are important parts of the treatment, especially if plethora, general or local, or scanty menstruation exists. In cases of this description, the digestive functions should receive strict attention, the bowels being kept regularly open. In the majority, and particularly if there is debility or deficiency of blood, or too frequent or too copious menstruation, the sulphate of quinine, with camphor and extract of hop, or extract of hyoscyamus; the preparations of cinchona, with the alkaline subcarbonates, or with the mineral acids, according to circumstances, and the preparations of iron, will prove of great service if appropriately administered. In some instances of the association of hysterical affection with tenderness of the spine, and with neuralgic pains in the corresponding nerves, I have found, after local depletions and alvine evacuations, pills containing full doses of the sulphate of quinine and sulphate of iron, with camphor and extract of hyoscyamus, very beneficial, and have added the purified extract of aloes to them with advantage, when the bowels were costive, or the catamenia deficient. Where the powers of the constitution are not impaired, or where there is excited action, an occasional recourse to the draught with spirits of turpentine and castor oil, or to the enema containing the same substances, will be of essential service.

86. *External means* of various kinds have been applied to the spine in these cases, often without benefit, sometimes with detriment, particularly when the increased sensibility depended upon sympathy with other parts, and upon great nervous debility. When there is sufficient evidence to infer that inflammatory irritation and turgescence have been excited in the membranes or investing structures of the spinal cord, then certain of these applications, as leeches, scarification and cupping, the tartarized antimonial ointment, or issues, will be more or less beneficial; but in other circumstances they will be of no service. The relief which has followed the application of blisters, or of rubefacient and stimulating plasters, is no proof that the morbid sensibility of the spine depended in these instances upon inflammatory excitement or vascular turgescence; for, if these morbid states had existed in any degree of sthenic activity, these applications were more likely to have aggravated than to have removed them. Where they have actually given relief, there is reason to infer that the morbid condition was one of deficient vascular and nervous energy, rather than the reverse, and one for which general restoratives or tonics, as well as local excitants, were required. Much attention to the states of the various functions, particularly of those of the abdominal and pelvic viscera, and great discrimination, are necessary in these cases, to determine aright as to the local means appropriate to the various conditions of this class of affections. There are some applications which will not be injurious under any circumstance, but will be serviceable in many. The chief of these are the warm terebinthinate epithem and embrocation already noticed (§ 78), applied over that part of the spine, chiefly, where pain is felt. Plasters, also, consisting chiefly of ammoniacum, compound pitch, or of red oxyde of iron, &c., will subsequently prove useful. Where signs of inflammatory action of the ligamentous or other structures of the spine are present, the above liniment, epithem, or embrocation, applied to the affected part, and setons, issues, or open blisters, some distance below it, so as to produce a derivation from the seat of morbid action, will frequently afford great relief.

87. *k. Pain in the sacrum and os coccygis* is generally not to be imputed to the same morbid states as that referred to the spine. It frequently depends upon the condition of the uterus, particularly about the *os* and *cervix uteri*, and requires the same treatment as that advised for pain behind or above the pubis (§ 81). Whether proceeding from this source, or from disorder near the origins of the nerves, or from disease of the structures of the spine, or of adjoining parts, the means just recommended, constitutional as well as local will be useful when judiciously employed.

88. *l. Hysterical affections of the hip or other joints* (§ 26) are very difficult to manage, and require, for their removal, not merely an improvement of the general health, but also strong impressions upon the mind and nervous system. The *intentions of cure* above stated (§ 76) should be fully followed out, and the particular means already described fairly tried. The medicines which I have found the most successful are, the *spirits of turpentine*,* prescribed in various modes, internally and externally, and administered in enemata; the *preparations of iodine*, alone, or with *narcotics*; and *camphor*. These, however, should be associated with suitable adjuvants; among which, the several *narcotics* and *antispasmodics* are the most important. The warm or vapour bath, simple or variously medicated; mental excitement, and exercise

* The spirit of turpentine was first recommended by the author for these states of hysteria, and for neuralgic and similar affections. It has recently been advised for the same complaints by some French physicians. The originality of the practice may be known by referring to *A Memoir on the Employment of Terebinthinous Remedies in Disease*, by JAMES COPLAND, M.D., &c., published in the *Lond. Med. and Phys. Journal* for July and August, 1821, p. 107–192.

taken regularly and energetically, and employment of the mind, are also important aids in the treatment. The affections of the joints are sometimes accompanied, or even alternated with severe nervous pains in the extremities, and occasionally with tenderness in some portion of the spine. In such cases the treatment hardly requires any material alteration. In those which have come under my care I have very frequently prescribed the spirit of turpentine, as already stated (§ 83), and often repeatedly in enemata; and, after two or three doses of it, I have commenced with the preparations of iodine, conjoined with henbane, opium, or belladonna. While the iodine has been given, the turpentine has been administered in enemata, from time to time; and the embrocation or liniment above described (§ 78) assiduously employed. In recent cases, particularly when the knee joint was affected, this treatment has removed the disorder in a few days. In the case of a lady, whom I saw with Mr. Faxon, the complaint in this joint was almost instantly removed by the warm turpentine epithem applied around the knee. Various other medicines may be tried, and, indeed, require to be tried, before some of the foregoing will be submitted to by the patient. Most of the cases which I have seen have been very obstinate, and have been treated by the more usual remedies, as the mineral sulphates, the preparations of iron, the sulphate of quinine, narcotics, &c., before I saw them. Sir B. Brodie mentions favourably a long-continued course of the sulphate of copper in small doses. The external application of the vegetable alkaloids, and of their salts, particularly veratria, aconitina, &c., in ointments or liniments, has recently been recommended for cases of this description, and particularly for those attended by neuralgic pains, in much stronger terms than the real advantage derived from them warranted. I have prescribed these preparations in several instances of this kind, and have had the prescriptions prepared by the very best chemists, but permanent advantage was seldom derived from them.

89. Local hysterical pains will sometimes be relieved by friction with a stimulating liniment containing some narcotic (F. 297 et No. 261). Sir B. Brodie recommends a lotion consisting of equal parts of spirit of rosemary and camphor mixture to be applied tepid to the affected part. The simple exposure of the part to the vapour of hot water—the heat and vapour being confined by oil skin, or by any other means—will often be useful. The vapour bath, employed thus locally, will be still more serviceable when the affected limb is cold, or is alternately hot and cold. It has been recently prescribed by Dr. J. Wilson in these and similar affections. (*Pract. Treat. on the Curative Effects of Simple and Med. Vapour, applied locally*, &c., 8vo. Lond., 1837.) Sir B. Brodie states that he has found the hysterical painful affections characterized by alternations of heat and cold much relieved by the following plan: "During the hot fit, let a compress be applied wet with a cold spirituous lotion; and when the heat has subsided, let a thick woollen stocking be drawn over it, and then an oiled silk covering over the stocking, so as to confine the heat and perspiration. When the cold fit has subsided, the oiled silk covering may be removed. This treatment, however, should be combined with the exhibition of the sulphate of quinine." I have found the quinine more beneficial when given with camphor in these cases. The oxydes or carbonates of iron may also be tried in electuaries, and conjoined with the confection of senna or of scammony when the bowels are costive.

90. *B. When hysteria assumes anomalous spasmodic forms, or simulates other spasmodic affections* (§ 31), the same principles of treatment as have been already explained should be adopted, according to the states of general or local vascular plethora, and of uterine function, and to the symptoms referrible to the spine. There are few cases of this kind in which the spirits of turpentine, judiciously prescribed, or administered in enemata, will not prove of essential benefit; and some will require, in addition, the warm epithem, liniment, or embrocation already described (§ 78); but these can only be resorted to at considerable intervals. The tonics, antispasmodics, and anodynes—the general plan of treatment recommended—must be duly exhibited; and if evacuations be necessary, they should be resorted to as above directed. In most respects these affections require nearly the same *indications of cure*, and the *same means* to fulfil these indications as have been directed for the more painful complaints just passed under review, and particularly for those seated in the joints and extremities.

91. For *hysterical cough* or *asthma*, antispasmodics, with anodynes or narcotics, are very useful. The preparations of valerian with ammonia or camphor, and henbane; a weak decoction of senega with emollients and hydrocyanic acid; small doses of ammoniacum, asafœtida, or of squills, with demulcents; the alkaline subcarbonates and extract of poppy, &c., will severally be found of service. The treatment, however, must be modified, as previously advised, according to the states of the constitution and habit of body, of the catamenia, and of the temperature of the surface. The *external means* described above (§ 86) will very materially assist the internal remedies, and sometimes the warm bath will be useful. In *hysterical hiccough*, camphor and other antispasmodics, with anodynes, and the means just noticed, cold fluids, and cold enemata, will be found advantageous. (See, also, the *Treatment* advised for Convulsions, and for Chorea and its related Affections.)

92. *C. The comatose, cataleptic, or soporific states of hysteria* (§ 33) require but slight modifications of either the indications or means insisted upon above. During these states the remedies advised for the paroxysm may be employed, appropriately to the local or general states of the circulation; and the most important of these are cold affusions or cold lotions on the head, and, in some instances, enemata of cold water, or containing the spirit of turpentine, or asafœtida, or camphor. Subsequently the treatment should be directed according to the state of the cerebral circulation. In most cases of this kind, the disorder of the uterus has excited, or otherwise deranged the circulation in the brain; but generally in such a manner as to be relieved by the shower bath, or by frequently sponging the head with cold fluids. Due attention to the states of the bowels and

of the catamenia, and the other means advised for CATALEPSY and CATALEPTIC ECSTASY (§ 18), are necessary for cases of this kind. When hysteria assumes the form of *syncope* or *leipothymia*, sprinkling the face with cold water; the *cold douche*, or affusion on the head; volatile or empyreumatic vapours, held at some distance from the nostrils; bathing the face and neck with aromatic waters or spirits; pure air, &c., are the chief means of restoration; after which the treatment must be conducted as above.*

93. *D. Paralytic affections and aphonia* (§ 35) hardly require any notice as respects the treatment, as the *indications* and *means* of cure already prescribed are equally appropriate for them. After the bowels have been freely evacuated, and local irritations or congestions removed, a resolute exertion of volition, exercise in the open air, and mental and bodily employment, as far as they can be pursued, are especially beneficial in them, particularly when aided by a judicious administration of tonics or antispasmodics, by suitable diet and regimen (§ 100, *et seq.*), and by recourse to external remedies, particularly to frictions of the surface with stimulating and rubefacient liniments, to warm or medicated baths, &c. When the paralytic state is manifested chiefly in the alimentary canal or urinary bladder, enemata containing the spirit of turpentine, or the warm terebinthinate epithem, or embrocation, applied over the abdomen, will be found almost immediately efficacious.

94. *E. Hysterical disorders of the mental faculties* consist not merely of the states already mentioned (§ 38), but of others of a less decided, but not less morbid kind. Hysterical females are not merely capricious or whimsical, but they often become enthusiastic for a time in the pursuit of an object, or in cherishing an emotion by which they have been excited. In many such cases the nervous excitement and vascular turgescence of the uterine organs determine the character of the mental disorder; elevating certain of the moral sentiments, or of the intellectual manifestations, to a state of extravagance, passing, in some instances, into delusion or monomania. Many cases of puerperal mania are merely extremes of the hysterical disorder of the moral and intellectual powers or states of the mind. All these more extreme forms of mental affection are observed only where, in connexion with much local or uterine irritation, there is great deficiency of nervous energy generally, and of mental power in particular; or where, with such deficiency, there has been either much injudicious culture, or perversion, or improper excitement of the imagination.

95. Females sometimes become passionately attached to an object; and this passion may advance even to nymphomania or monomania. The same person, on experiencing a disappointment in her affection, or if she be placed in circumstances entirely preventing the enjoyment of her passion, often becomes enthusiastically religious, especially if powerfully excited by powerful popular preachers. After field preachings, or other ministrations of an exciting kind, the most hysterical females, especially those who have experienced the fully developed fits on these occasions, have become, at least for a time, the most religious. In this, however, there is little to regret; there is no harm, and generally much good from this direction of the feelings, unless, indeed, advantage be taken of this excitement by certain Tartuffes, especially at love-feasts, &c.: a circumstance by no means rare.

96. The hypochondriacal feelings, the desire to deceive, or to simulate various diseases, or the delusions which sometimes possess the minds of hysterical females, may be classed with the foregoing, as requiring a similar plan of treatment. In all of them the *intentions of cure* are, to remove irritation or vascular turgescence of the uterine organs; to improve the general health; to strengthen the nervous system; to calm the imagination, and to guide the moral impulses of the patient. The means by which the physical portion of these indications are to be fulfilled have been sufficiently explained. The most efficient, however, of these means are not likely to be adopted by the patient if she is entirely uncontrolled by friends. Few will resort daily to the shower bath, or even occasionally to terebinthinate enemata, or submit to a course of tonics, or to a suitable regimen, &c., while she believes her health but little affected. Even when the hysterical disorder is of a very painful kind, the variability or capricious state of her mind leads her to run from one physician to another before opportunity of administering aid is afforded to any. At last, the most notorious charlatans, particularly those who either excite the body

* [A remarkable instance of this form of hysteria fell within the practice of Dr. FRANCIS, of this city, several years ago. The patient, a young, unmarried lady, aged about 16 years, had previously suffered from irregularities of the monthly lustrum, and from partial and painful menstruation. After the periodical continuance of these annoyances for some six or seven months, her habit of body became chlorotic; the functions of the liver were imperfectly performed, torpor of the bowels ensued, and peculiarities of disposition, with an unequal and often agitated state of mind, followed. Cerebral fulness was now manifest; great indifference to objects around her, and a disposition to sleep at capricious and uncertain periods of time within the twenty-four hours. The protracted duration of these symptoms led her parents to consult several of the faculty, and an eminent surgeon, now no more, pronounced her case spinal disease. At this period of her illness hysterical symptoms arose from the slightest exciting causes; and the soporific form of the complaint now became so confirmed that, not unlike chorea, she had stated daily exacerbations, followed by sleep, which took place with the regularity of the timepiece, at 12 o'clock noon on each day, and continued in this condition for full one hour and a half on each assault; this morbid propensity and suffering lasted full four months; the paroxysm each day came on with the utmost precision as to the hour, and lasted with uniformity, as already remarked. During these attacks her pulse was feeble, slow, and regular; no agitations in the room, nor molestations of her person awakened her; her temperature was natural; her eyes appeared clear and animated. The paroxysm having terminated by its own limitation, she arose in a deliberate manner, walked about the room, seemingly unconscious of what had occurred; entered into calm conversation, or, perhaps, asked for food. This remarkable case was not characterized by any vehement jactitation, nor did the intellectual faculties suffer by the invasion. The plan of setons, issues, &c., &c., having proved altogether unavailing, she was subjected to repeated venesections, purgatives, alterative action, and LUGOL'S tincture of iodine, and the tepid bath. These were followed by antispasmodics, valerian, musk; gestation and exercise in the open air enjoined, and a corresponding alteration in her diet adopted; within five months from the period when she first fell into her diurnal sleep, she had overcome her propensity to that condition, and gradually recovered her natural functions and health. She is at present the mother of several children and in good health. This case has, in many respects, a resemblance to that entitled "*periodical jactitation*," recorded by Dr. WATT in the Medico-Chirurgical Transactions of London, vol. v.]

through the mind, or the mind through the body—the animal magnetizers, the Homœopathists, the St. John Longs of rubbing celebrity, and the Campbells of celestial-bed notoriety—fix her attention. At such medical bagnios there is something promising gratification as well as excitement, and at such places hysterical as well as hypochondriacal patients "most do congregate."

97. iv. Of the Prophylactic Treatment of Hysteria.—*a. The avoidance of the occasional causes* is the chief part of this treatment, and this is very difficult. The moral emotions and desires constitute the principal of these causes, and the prevention of them is not in the power of the physician, and, considering the general frailty of our nature, rarely in the power of the patient. A physician sufficiently acquainted with human nature, and with human life and society, will frequently discover the connexion of the complaint with the feelings, and be able to give useful hints to the patient or her friends as to the moral, as well as to the medical management of the complaint. But his proper business is to correct the predisposing or constitutional cause, and to enable the patient to resist the exciting causes. An indolent, a luxurious, and an unoccupied life leads to late hours in bed, to an excited state of the imagination, to susceptibility of the nervous system, to irritation and turgescence of the generative organs, and to general or local plethora. It cannot be sanguinely hoped that females will relinquish ease, luxury, and enjoyment from the dread of a distant and contingent ill. Most physicians of experience must have often observed the influence of these causes on the health, and have met with instances of females, who, when in ease and luxury, were subject to hysteria, having become entirely free from it when reverses of fortune obliged them to employ both mind and body.

98. *b.* Much depends upon the *moral* and *physical* education of females about the period of puberty in preventing hysteria. If more time were devoted to air and exercise, and less to mere accomplishments—if less strenuous efforts were made to cram much ill-assorted knowledge into the mind in a very limited period—than usually is the case in the present day, an improved state of nervous energy and of constitution generally would result. There would consequently arise a race of females possessed of stronger minds, and better able to make good wives and healthy mothers than those too frequently met with in the easier ranks of life. Of all the physical influences by which the human constitution is permanently impressed in early age, there are none so powerful as *light*, *air*, and *exercise*. Females, while the frame is being developed, should strictly observe early hours, so that *the period of repose* should never be prolonged much after the dawn of morning. The propriety of *sleeping* in a large, well-ventilated room cannot be disputed. It will be prudent, where more than one must sleep in the same apartment, to have separate beds, each no larger than is necessary for one person; and if the room is sufficiently large and airy, three, but no more, should sleep in it, preferably to two. When very early rising is enforced, the kind of bed on which growing females should sleep is not very important, although a hair mattress is perhaps the best; but the bed-clothing should be light, and the sitting as well as the sleeping apartments ought to be moderately cool and airy.

99. The kind of exercise which is most serviceable is that taken in the open air and in the light of day, and which brings into action the voluntary muscles generally, especially those of the lower extremities. It should preferably be on foot, and be regular, daily, and neither too little nor excessive. Sydenham, Fuller, Mandeville, and Manning advise riding on horseback, as affording the briskest motion, and occasioning the least fatigue. It ought always, however, to be used when the stomach is most empty; for, after a full meal, it retards digestion, rendering it uneasy and flatulent. It is most serviceable when hysteria is associated with retention of the menses and a chlorotic state of the system, or when there is torpid action or obstruction of the digestive and abdominal viscera. In cases of this description, the advice given by Mandeville will be found of great benefit. This is, to rise before six; to have half an hour's exercise in a swinging chair, flying horse, or the common swinging rope, and then breakfast; some time afterward to get on horseback, for at least two hours, either galloping or trotting, as much as her strength will permit her; and, immediately after this, to be undressed and assiduously chafed or dry-rubbed for a considerable time, till her skin looks red, and her flesh glows all over. Manning observes that frictions are useful, not only in the cure of the paroxysm, but also as a prophylactic. He directs them to be used on the extremities and trunk of the body, and especially on the abdomen, when the digestive organs are weak. If hysteria be attended with the anomalous symptoms already noticed, or assume an irregular form, friction applied daily and assiduously along the spine will be of great service. Sailing has been recommended by Dr. Gilchrist in the treatment of hysterical and other nervous complaints; and in certain circumstances it will be found useful.

100. *c. Cold bathing*, particularly salt-water bathing and the shower bath, will generally be serviceable at this period of life if females have no particular dread of either, and if the surface of the body be afterward well rubbed, and smart exercise immediately taken. For delicate constitutions, with a predisposition to the disorder, it will be preferable to commence with a warm salt-water bath, or with a tepid shower bath, the temperature being gradually lowered to the usual grade. Sponging the surface of the body, also, every morning with salt and water, or with water containing some vinegar or a little of the nitro-muriatic acid, the temperature being at first tepid, but gradually reduced to the usual mean of cold, will generally prove most beneficial, not only in preventing the complaint, but also in removing it.

101. *d.* Various *mineral waters* frequently prove of great advantage in the preventive as well as in the curative treatment of hysteria. There is no doubt of the *Bath* waters being often beneficial in this complaint, although fashion has brought them into disuse by bringing others into more general notice than they deserve. In females of a delicate constitu-

tion, with a languid state of the circulation, and want of tone of the nervous and muscular tissues, these waters, with proper management, will generally be most useful. In a similar state of system, the mineral waters of *Vichy*, *Barèges*, *Marianbad*, *Eger*, *Carlsbad*, *Pyrmont*, *Spa*, *Hartfell*, and *Tunbridge* will also be of great service if employed appropriately to the pathological peculiarities of the case. The stronger chalybeates, however, should not be prescribed when the complaint is connected with general plethora, or where there is very marked vascular turgescence or excited action of the generative organs. Where these waters are indicated, as well as in more doubtful cases, the springs of *Ems*, of *Bath*, and of *Seltzer* will often be very beneficial. Seltzer water, with warm milk, may be used as the common beverage in most cases. As most of these waters may be procured in London and Brighton, there can seldom exist much difficulty in trying them without leaving this country, or even the patient's home. The warm mineral waters can, however, be used only in *Brighton*, where they are prepared in a way not much inferior to their natural state. In connexion with the use of suitable mineral waters, *change of air* will be most beneficially prescribed. Indeed, much of the benefit attributed to the former actually proceeds from the latter, and in all cases where benefit is derived, both means are concerned in producing it.

102. *e.* The *diet* of hysterical females, as well as the medicines prescribed, should have strict reference to the states of the vascular system and of the uterine organs. In general, a milk diet, as advised by Sydenham, is very serviceable, particularly where debility is present; but much animal food is hurtful, especially where there is a tendency to plethora. A fish diet and the use of shell-fish are not less injurious, as favouring uterine turgescence, although much less productive of vascular fullness. A spare and cooling diet, consisting chiefly of farinaceous substances, is the most generally appropriate; but a somewhat liberal use of animal food is occasionally requisite. Slops, as weak tea, should be avoided. Boiled milk and bread should be preferred to either tea, chocolate, or coffee. The last is generally too heating, and ought not to be allowed when the symptoms of uterine turgescence or irritation become very prominent.

103. *f.* Patients subject to hysteria should avoid warm apartments, and crowded rooms or assemblies. The extremes of *temperature* are often injurious to them. They should preserve their extremities warm, and be careful not to confine any part of the body, and particularly the waist, by too strait clothes or stays. Mental and physical *occupations* are among the most beneficial means of treatment in this complaint, and advice respecting them should never be overlooked by the physician. The nature or kind of employment must entirely depend upon the circumstances and condition of the patient. The reading of exciting novels and of loose romances, and even music, are mere dissipations of time. The former ought not to be permitted by those who have the power of preventing it; and the latter should be subjected to a judicious control, and cultivated truly as an accomplishment, and as a relaxation from severer, and more rational, and more useful occupations.

104. As to advising marriage for young hysterical females, this, perhaps, may be as well let alone, although I do not altogether agree with Mandeville as to the risk of their children inheriting the complaint. He remarks, "In the first place, it may fail, and then there are two people made unhappy instead of one. Secondly, it may but half cure the female, who may have half a dozen children that shall inherit it. A physician has a public trust reposed in him; his prescriptions, by assisting some, ought never to prejudice others; besides, a young lady may not marry so well while she labours under this infirmity as if she was in perfect health. Therefore, let her either be first cured, and then marry without being injurious to herself, her husband, or her posterity; or else remain single, with this comfort, at least, in her affliction, that she is not liable to entail it upon others, who should be no less dear to her than herself." A principal reason for hysterical mothers having children that are hysterical and nervous is, that they are generally bad nurses, their milk being either deficient or innutritious: when their infants are suckled by strong and healthy nurses, no such hereditary influence is usually observed. Nothing is of greater advantage in hysterical disorders than mental tranquillity and cheerfulness. Fear, grief, and anxiety ought to be avoided, and the mind should be agreeably entertained and interested by useful employment.

[But little remains to be said as to the treatment of this affection, which is at all times difficult, and perhaps in some cases impossible, unless, as Mackintosh has observed, we had the power of changing the temper, altering the disposition, subduing the passions, and relieving the mental distresses of the fair sufferers. The causes appear, in many instances at least, to be too deeply inwrought in the constitution to be effectually eradicated; although the persevering employment of judicious hygienic measures will do much towards rendering the unhappy subject less amenable to their influence. The present mode of educating females, especially as pursued in fashionable boarding-schools, must always furnish a numerous host of candidates for this anomalous malady, in which it is difficult to decide whether the mind or the body be most in fault. That tight lacing, inactive habits, reading of highly-wrought and voluptuous novels, overtasking the intellectual faculties, the use of strong tea and coffee, &c., to all which the inmates of such establishments are more or less exposed, must, sooner or later, lead to serious derangements of the nervous system, is by no means a matter of surprise; and when once the hysterical diathesis is established, it is not an easy matter to prevent its outward manifestations by the usual symptoms. We therefore deem it of the first importance that the profession should use their united influence in disseminating correct views in relation to the proper education of the young, point out to parents, guardians, and teachers, the best means of guarding the constitution against the inroads of this, as well as every form of disease; that they should not

only inculcate, but act upon the principle that prevention is far easier, as well as better, than cure; for, although by so doing they may lessen their own pecuniary gains, they will nevertheless be amply compensated in the reflection that they have contributed in no small degree to increase the happiness of the most interesting portion of the human family.

Where a female is liable to hysterical attacks, she should be confined to a light and nourishing diet; take much exercise in the open air; use cold sponging, or the shower bath in the morning; avoid tight lacing; tea and coffee; hot rooms and late hours; strong moral emotions and novel reading; sleep on a hair mattress, in a large and well-ventilated apartment; and, what is of equal importance, the mind should be strengthened by being employed in healthful and interesting pursuits, with frequent indulgence in innocent and rational amusements. The objects aimed at are, to restore the nervous system to the requisite degree of stability, and to correct the disordered functions of the uterine system.

Dr. Dewees was frequently in the habit of bleeding during the hysterical paroxysm, with the view of diminishing the force of the pulse, shortening the fit, preventing dangerous engorgements, and preparing the way for the successful exhibition of other remedies. He maintains that after bleeding we can often employ remedies, agreeably to the presenting indications, with much more certainty and safety. If the cause, however, is mental, he directs sedatives and antispasmodics to be given, either by the mouth or rectum; as tincture of opium, with asafœtida; while cold water is to be dashed upon the face, and flannel, dipped in hot mustard water, applied to the feet and legs. He cautions against the application of volatile and stimulating substances to the nostrils, as calculated to excite the brain through sympathy, at a time when the abstraction of stimuli is highly desirable. "This practice," says Dr. D., "most probably arose from the success of such substances in syncope; but between syncope and an hysterical convulsion there is not the slightest analogy; in one instance, the muscular, the arterial, and nervous symptoms are violently excited; in the other, they are, for the time being, paralyzed."—(*On Diseases of Females*, p. 542.) Where indigestible food has been taken into the stomach, an emetic is to be given; and if the bowels are costive, a copious enema of salt and water; these, with blisters, or sinapisms to the legs or feet, comprise the remedial measures recommended by this author.

According to our experience, the application of cold water is one of the best remedies for hysteria, both in the way of prevention and cure; we have also seen much benefit derived from the use of chalybeate waters, as the Pavilion, Putnam, and Iodine Springs at Saratoga; but the exercise, pure air, and change of scene undoubtedly contributed to the invigoration of the nervous system, and the consequent abatement of the hysterical attacks.

It is in the treatment of this affection that Mesmerism and homœopathy have achieved some of their greatest triumphs and gathered some of their brightest laurels. The freaks of an hysterical paroxysm have again and again been passed off upon a credulous and gaping crowd as the highest development of *clairvoyance*, and the cataleptic coma of the disease has confirmed the faith of thousands in the wonder-working gifts of some speculator who has the power of exciting the susceptible female imagination by his grimaces or his manipulations.

So, also, the confidant assurance of speedy recovery, with a regulated diet, suitable exercise, and a few globules of sugar, have often accomplished wonders; and the patient, fond of the marvellous and the strange, and either incapable of, or unwilling to attribute her cure to its true causes, extols the efficacy of the new system, and turns homœopathic missionary for the benefit of suffering humanity at large. Were the followers of Hahnemann, after the manner of the ancients, to canonize this malady, and erect a temple to the goddess Hysteria, they would barely manifest a proper sense of gratitude, and their votive tablets would rarely have to be consecrated to another.]

Bibliog. and Refer.—*Celsus*, l. iv., c. 20.—*A. Aretæus*, l. ii., c. 11.—*Galenus*, De Loc. Affect., l. vi., c. 5.—*Paulus Ægin*, l. iii., c. 71.—*P. Touret*, Ergo Hystericis Venus. Paris, 1570.—*Denizot*, Ergo Hystericis Venesectio. Paris, 1573.—*Ballonius*, De Morb. Mul., v., Opp. iv., p. 147.—*B. Rousseus*, De Hominis Primordiis Hystericisque Affectibus, &c. Lugd. Bat., 8vo. 1594.—*Sydenham*, Opusc., p. 407.—*A. Laurentius*, De Hystericis Affectionibus Infantilibusque Morbis. Lion., 8vo, 1595.—*Primerosius*, De Morb. Mul., l. ii., c. 5.—*E. Jorden*, Briefe Discourse of a Disease called the Suffocation of the Mother. Lond., 4to, 1603.—*Bouvard*, Ergo Mulieri Præfocatæ Vir Succulentus. Paris, 1612.—*Horstius*, Opp., ii., p. 274, 285, 294.—*Mercurialis*, De Morb. Mul., l. iv., c. 22.—*N. Highmore*, Exercitationes duæ, quarum prior de Passione Hysterica. Oxon., 12mo, 1660; et Epistola ad *Thomam Willis*, de Passione Hysterica. London, 4to, 1670.—*Ruland*, Cur. Emp., cent. ii., cur. 83.—*T. Willis*, Affectionum quæ dicuntur Hystericæ, &c., Pathologia vindicata. Lond., 4to, 1670; et Affectionum quæ dicuntur Hystericæ et Hypochondriacæ Pathologia Spasmodica Vindicata. Lond., 12mo, 1678.—*Dacquet*, Ergo Venus Hystericarum Medela. Paris, 1674.—*Riedlin*, Lin. Med., 1700, p. 199.—*J. Purcell*, A Treatise of Vapours or Hysteric Fits. Lond., 8vo, 1701.—*Stahl*, De Hypochondriaco-Hysterico Malo. Hal., 1703.—*Cruger*, De Magnetismo Rerum, et de Uteri Ascensione. Zittau, 1712.—*P. Hunauld*, Dissertations sur les Vapeurs, et les Pertes du Sang. Par., 12mo, 1716.—*R. Blackmore*, A Treatise on the Spleen and Vapours, &c. Lond., 8vo, 1725.—*Viridet*, Dissertation sur les Vapeurs, &c. Yverdon, 1726.—*Morgagni*, De Sed. et Caus. Morb., ep. xlv., art. 17, 20.—*B. Mandeville*, Treatise on the Hypochondriac and Hysteric Diseases, &c., 8vo, 3d ed. Lond., 1730 (*A work learned, satirical, and judicious, in which medical humbug is ably exposed. It will be read with great advantage at the present day*).—*F. Hoffmann*, De Morbi Hysterici vera Indole, &c. Hal., 4to, 1733; et de Malo Hysterico, obs. 12, Opp. iii., p. 63.—*Mauriceau*, l., p. 447.—*Delius*, Amœnit. Acad. Dec., v. n. s.—*G. Cheyne*, The English Malady, &c. Lond., 8vo, 1733.—*Lucas*, in Med. Observat. and Inquiries, vol. v., p. 73.—*A. E. Büchner*, Pathologia et Therapeia Passionis Hysterici. Erf., 4to, 1739; De Clavo Hysterico. Hal., 1751; et Casus rarior Affectus Spasmodico-Convulsivi Vagi. Hal., 1764.—*J. Andree*, Cases of Epilepsy, Hysteria, Fits, &c. Lond., 8vo, 1746.—*Blankard*, Collect. Med. Phys., cent. i., n. 70.—*J. Astruc*, Traité des Maladies des Femmes, t. iv., p. 54.—*Ch. Perry*, A Mechanical Account of the Hysteric Passion. Lond., 8vo, 1755.—*Juncker*, De Commodis Ambiguis ex Matrimonio Hystericarum. Hal., 1755.—*J. Raulin*, Traité des Affections Vaporeuses du Sexe. Par., 8vo, 1758.—*Saxtorph*, in Act, Soc. Med. Havn., vol. iii., No. 9.—*Ranoé*, in Act. Reg. Soc. Med. Havn., vol. iii., p. 360.—*J. Hill*, The Construction of the Nerves, and Causes of Nervous Disorders. Lond., 8vo, 1758.—*Rave*, Beobactungen und Schlüsse, b. ii., p. 77.—*J. Astruc*, A Treat. on Dis. of Women, &c., transl. from the French, vol. ii., p. 245.—*S. A. Ponticelli*, Trattato di Tre Specie d' Affezzione Isterica et Ipocondriaca. Lucca, 8vo, 1759.—*Tralles*, Usus Opii, s. iii., p. 44.—*R. Whytt*, The Works of, &c., 4to. Edin., 1768, p. 487, *et seq.*—*Stoll*, Rat. Med., p. 126, 166, 199.—*M. Fressavix*, Nouveau Traité des Vapeurs. Lyon., 8vo, 1770.—*A. J. Goez*, Beytrag zur Geschichte von den Hysterischen Krankheiten. Meining., 8vo, 1771.—*Smith*, An Apology to the Public for Practice in Hysterical Cases, 1775.—*A. Wilson*, Medical Researches into the Nature of Hysterics, &c.

Lond., 8vo, 1776.—*H. Manning*, Treatise on Female Diseases, &c., 8vo. Lond., 2d ed., 1775, p. 193.—*P. Pomme*, On Hysteric and Hypochondriac Diseases, translated from the French, &c. Lond., 8vo, 1777.—*D. Smith*, A Treatise on Hysterical and Nervous Disorders. Lond., 8vo, 1778.—*M. Ducasse*, Traité des Vapeurs. Sens, 12mo, 1781.—*J. Alsinet*, Nuovo Metodo para curar Flatos, Hypochondria, Vapores, y Ataques Hystericas. Madrid, 8vo, 1786.—*W. Rowley*, A Treatise on Female Convulsions, &c. Lond., 8vo, 1789.—*Young*, On Opium, sect. 25.—*Lettsom*, in Mem. of the Med. Soc. of London, vol. i., n. 7.—*Ranque*, in Mém. de la Société Médicale d'Emulation, an. iv., p. 214.—*Frank*, Acta Instit. Clin. Vilnensis, ann. i., p. 123.—*J. K. H. Ackermann*, Ueber Blähungen und Vapeurs. Naumb., 8vo, 1794.—*Cume*, in Mem. of the Med. Soc. of London, vol. iii.—*A. L. De Witte*, De Hysterica Passione. Lovan, 8vo, 1796.—*Dufau*, in Journal de Médecine, vol. xxix., p. 120.—*Fouquet*, in Ibid., vol. lvii., p. 445.—*Sims*, in Mem. of the Med. Soc. of London, vol. v.—*G. L. Duvernay*, Dissertation sur l'Hystérie. Par., 8vo, 1801.—*Bichât*, Anatomie Générale, t. i., p. 225.—*L. C. Louyer Villermay*, Recherches sur l'Hypocondrie et l'Hystérie. Par., 8vo, 1803; et Traité des Maladies Nerveuses. Paris, 8vo, 1817.—*Brehmer*, in *Hufeland*, Journ. der Pract. Arzneyk., b. ii., p. 457.—*Joerdens*, in Ibid., b. iv., p. 531.—*K. A. W. Berends*, De Hysterica Affectione Epilepsiam simulante. Franc., 8vo, 1806.—*J. H. D. Petetin*, L'Electricité Animale prouvée par la Catalepsie Hystérique. Paris, 8vo, 1806.—*Dumas*, in Journ. Général de Méd., 1810, Dec., p. 365.—*A. Maccary*, Essai sur l'Hystérie Sthénique et Asthénique. Paris, 8vo, 1810.—*J. Reid*, Essays on Insanity, Hypochondriasis, and other Nervous Affections, 8vo. Lond., 1816.—*K. J. Zimmermann*, Versüch ueber Hypochondrie und Hysterie. Bamb., 8vo, 1816.—*Hamilton*, On Purgative Medicines, chap. 7.—*Cullen*, Practice of Physic, by *Thomson*, vol. ii., p. 497.—*J. Copland*, Lond. Med. Repos., vol. xvii., p. 375.—*J. P. Falret*, De l'Hypocondrie, &c. Paris, 8vo, 1822.—*A. Pujol*, Œuvres de Médecine Pratique, par *F. G. Boisseau*, tom. i., p. 117. Paris, 8vo, 1823.—*J. F. Lobstein*, De Nervi Sympathetici Humani Fabrica, Usu et Morbis, &c., 4to. Paris, 1823, sect. 114.—*M. Georget*, De l'Hypochondrie et de l'Hystérie. Par., 8vo, 1824; et Dict. de Méd., t. xi. Paris, 1824.—*M. Trolliet*, in Révue Méd. Franc. et Etrang., tom. iii., 1825, p. 348.—*M. Lavacher*, in Journ. des Prog. des Sc. Med., t. xi., p. 245.—*V. Voisin*, Des Causes Morales et Physiques des Maladies Mentales. Paris, 8vo, 1826.—*T. P. Teale*, On Neuralgic Diseases. Lond., 8vo, 1829.—*J. Darwall*, in Midland Med. and Surg. Reporter, May, 1829.—*G. Tate*, A Treatise on Hysteria. Lond., 8vo, 1830.—*Boisseau*, Nosographie Organique, tom. iii., p. 741, and t. iv., p. 790.—*T. Addison*, On the Disord. of Females connected with Uterine Irritation. Lond., 8vo, 1830.—*J. L. Bracket*, Recherches sur la Nature et le Siége de l'Hysterie et de l'Hypocondrie, &c. Paris, 8vo, 1832.—*E. F. Dubois*, Histoire Philosophique de l'Hypochondrie et de l'Hystérie. Paris, 8vo, 1832.—*C. Gerard*, Mémoires sur la Nature, le Siége, &c., &c., de l'Hystérie et de l'Hypocondrie, in Trans. Med., par *Gendrin*, t. vii. Paris, 1832.—*Foville*, Dict. de Méd. et de Chirurg. Prat., t. x. Paris, 1833.—*J. Conolly*, Cyc. of Pract. Med., vol. ii., p. 561. Lond., 1833.—*Dubois*, in Encyclographie des Sciences Médicales, vol. vii. (D.), p. 84.—*Piorry*, in Ibid., vol. viii., p. 57 (G.).—*Lisfranc*, in Ibid., vol. xiv. (I.), p. 484.—*Carteaux*, in Ibid., vol. xv. (H.), p. 47.—*Chomel*, in Ibid., vol. xix. (J.), p. 493.—*Good*, Practice of Physic, vol. viii., p. 400.—*Macintosh*, Practice of Physic, vol. ii., p. 79.—*W. Griffin* and *D. Griffin*, On Functional Affections of the Spinal Cord, &c. Lond., 8vo, 1834.—*A. M. Bureaud-Rioffrey*, Education Physique des Jeunes Filles, ou Hygiène de la Femme avant la Marriage, 8vo. Paris, 1835.—*Robertson*, in Med. Gaz., vol. xv., p. 457.—*Roots*, in Med. Chir. Rev., July, 1836, p. 242.—*D. D. Davis*, Principles and Practice of Obsteric Medicine, vol. i., p. 396. Lond., 4to, 1836.—*B. C. Brodie*, Lectures Illustrative of certain Local Nervous Affections. London, 8vo, 1837; and in Med. Gaz., vol. xix., p. 197, 246, 249.—*Hulbert*, in Med. Gaz., vol. xix., p. 406.—*G. Andral*, Cours de Pathologie Interne. Brux., 8vo, 1837, p. 420.—*J. M. Gully*, Expos. of the Symp. and Nature of Neuropathy or Nervousness, 8vo. Lond., 1837. Lancet, Aug. 19, 1837, p. 782.—*Addison*, in *Guy's* Hosp. Rep., vol. ii., p. 496.—*Laycock*, in Edinburgh Med. and Surg. Journ., Jan., 1838, p. 78.

[Am. Bibliog. and Refer.—*Rush*, Medical Inquiries.—*Wm. P. Dewees*, A Treatise on the Diseases of Females. Phil., 8vo, p. 592, 1833.—*S. Jackson*, in Ibid., p. 548.—*Hosack*, Lectures.—*Eberle* and *Dunglison*, Pract. of Med., and occasional Articles in our Medical Periodicals.]

HYSTERITIS. See Uterus—*Inflammations of.*

JAUNDICE.—Syn. *Icterus* (from Ικτερος, the golden thrush, the sight of which was supposed by the ancients to cure the disease), Pliny, Cœlius Aurelianus. *Morbus Regius*, Celsus, Pliny. *Morbus Arquatus*, *M. Arcuatus*, Columella, Celsus. *Aurigo*, Plautus, Varro. *Cachexia Icterica*, Hoffmann. *Icterus*, Boerhaave, Linnæus, Cullen, &c. *Cholelithia Icterus*, Young. *Icteroides*, *Fellis Suffusio*, *Fellis Obstructio*, *Icteritia*, Auct. var. *Jaunisse*, *Ictère*, Fr. *Die Gelbsucht*, Germ. *Iterizia*, *Citrinezza*, Ital.

Classif.—3. *Class*, Cachectic Diseases; 3. *Order*, Cutaneous Diseases (*Cullen*). 1. *Class*, Diseases of Digestive Function; 2. *Order*, Affecting the Viscera (*Good*). IV. Class, I. Order (*Author in Preface*).

1. Defin.—*Yellowness of the eyes and skin, sometimes passing to a yellowish-green hue, or even to a greenish brown; the urine being of a saffron or deep colour, the stools generally pale, and the course of the bile obstructed.*

2. There are few diseases, the nature and morbid relations of which have occasioned greater diversity of opinions than jaundice. By some it has been viewed as a symptom of derangement, or organic lesion, of the biliary apparatus, more immediately dependant upon obstructed discharge, and upon absorption of bile. Others have considered it as independent of absorption of this secretion, and as the result of a morbid state of the capillary circulation. These, as well as other opinions, will be more fully noticed in the sequel; and I shall then show that it cannot be considered merely as a symptom of the morbid states of the biliary apparatus, to which it has commonly been attributed, although very often connected with, and sometimes originating in these states. It occasionally appears in the course of bilious fevers, when there is no obstruction to the evacuation of bile. But the yellowness observed in the last stage of yellow and malignant fevers is not a symptomatic jaundice, the change of colour depending, in these maladies, upon the morbid state of the blood, and upon the change in the capillary vessels and circulation, independently of biliary obstruction.

3. Jaundice is generally *sporadic*; but, according to Monro, Alibert, and others, it has assumed, on rare occasions, an *epidemic character*, particularly at the terminations of campaigns, and after or during very wet summers and autumns. It was thus said to have been epidemic in Cronstadt, in 1784 and 1785; and at Geneva, in 1814. It is *endemic* in some places, particularly those in which, with a high range of temperature, the sources of malaria abound (see Endemic and Epidemic Influences); but it is generally owing to the prevalence of biliary diseases and periodic fevers in these localities that jaundice is also endemic.

4. I. Symptoms.—*A. Precursory.*—Jaundice generally approaches with langour, depression of spirits, slight chills or rigours, anorexia; with uneasiness, tension, or weight at the præcordia; with flatulence, sour eructations, sometimes nausea or vomiting, or other disorders of the stomach; or with colicky pains, disturbed or irregular bowels, and headache. The stools are hard, ash-coloured, clayey, or whitish, indicating an absence of bile; and sometimes relaxed, although the evacuations are pale or whitish. In rarer cases, the biliary secretion is apparently more than usually profuse. The stools are commonly devoid of their usual odour, and are more or less offensive. There

is an unpleasant taste in the mouth, with some thirst. The tongue is loaded at its base. The skin is dry, and an itching or stinging is often felt on the surface. These symptoms are usually of short duration, and the affection manifests itself with much celerity.

5. *B.* The *yellow tinge* generally begins in the eyes, and extends to the temples, brows, and face; and thence to the neck, chest, and whole surface of the body. The colour is deepest in the wrinkles and folds of the skin, and in the lines of the face and hands. Sometimes it is distributed in deeper patches in one place than in another. It commences in the superior parts of the body, appears latest on the inferior extremities, and departs first from the parts where it commenced. The colour varies from a light yellow or lemon-colour to a greenish brown, the intermediate shades of pale yellow, deep yellow, and yellowish green being most common. With dryness of skin there is generally increased heat, particularly on the hands and feet. The itching and stinging are often, also, augmented, especially towards the night, and are most troublesome about the nostrils. In the more advanced stages this symptom is diminished. The perspiration often then becomes free, particularly if the disease be attended by fever; and in some cases so abundant as to wet the linen, and to tinge it of a deep yellow. Sometimes a desquamation of the cuticle, or a psoriform eruption, follows these symptoms.

6. The bowels are frequently costive, and the fæces clayey, pale, and scanty; but in some cases they are loose, and have a peculiar fœtor. The urine is commonly high-coloured; yellowish and limpid at the commencement, afterward deep saffron-coloured or reddish, frothy, and thick. Sometimes it is nearly black, depositing a brick-coloured sediment; at other times a dark deposite. As the disease subsides, the urine resumes its clear and limpid appearance, unless dropsy supervene. The patient generally complains of a severe, heavy, or lancinating headache, with a sense of heat, particularly at the forehead; and he often falls into a state of despondency or melancholy, or becomes morose. There is sometimes lethargy, and frequently watchfulness. The tongue and palate are coated with a yellowish sordes, and a bitter taste is felt in the mouth. The appetite is extremely irregular; sometimes being entirely lost, at other times ravenous. Thirst is usually present. Pain, weight, or a dragging sensation and tenderness are often felt at the epigastrium; frequently with flatulence, acrid eructations, nausea, difficult or painful digestion, and vomiting of a bitter, acrid, and sometimes dark fluid. In some cases, acute pain runs in the course of the common duct, and increases as it reaches the epigastrium, with more or less uneasiness in the region of the liver and top of the right shoulder, or beneath the right scapula, or between the shoulders. Violent pain is occasionally felt in the stomach, with short fits of colic. The respiration is readily accelerated, especially upon exertion; and there are sometimes paroxysms of cough. The pulse varies exceedingly. At the commencement it is often hard and strong, but it is also frequently feeble, particularly as the disease advances. When severe paroxysms of pain are complained of, the pulse generally becomes frequent, hard, or full; but it is occasionally much slower than natural. Hæmorrhoids sometimes occur during the disease; and they have often, after having discharged freely, proved a salutary crisis. Epistaxis has also been followed by a favourable result, but less frequently than the former evacuation.

7. Some *anomalous* appearances have been remarked during jaundice, which are deserving of notice, from the light they may throw on its pathology. The most important of these are, 1st. The suddenness of the attack—the almost instantaneous occurrence of it after violent affections of the mind. 2d. Its restriction to particular parts of the body. Behrens, Valsalva, Ettmuller, and others have obseved it confined to the palsied side in cases of hemiplegia. Dr. Chapman has seen it limited to the face. A similar case has occurred to myself; and instances of its appearance only in the eye are not uncommon. Allied to these states is the varying deepness of colour in different parts of the body. The deep greenish-brown, verging to black, of the skin, commonly called green or black jaundice, described by Dr. Baillie, has been observed in one part of the body, while the usual yellow tinge has existed in others. Lanzoni met with a case wherein the throat and face were green, the right side of the body a greenish-black, and the left yellow. 3d. The yellow tinge which objects occasionally exhibit to the patient during this disease has been a matter of dispute; but it has been noticed and believed in by the majority of ancient authors, and was first disputed by Mercurialis, and afterward by Haller, Heberden, Chapman, and a few others. I believe it to be of rare occurrence, but to undoubtedly occur when the cornea, or humours of the eye, participate in the yellow tinge, with the other parts of the body.

8. *C.* Duration.—Jaundice may disappear or terminate fatally in a short time, or it may continue for many months. When it proceeds from moral or mental causes, it is generally of much shorter duration than when it depends upon visceral disease. In the latter case it may endure even for years. But instances sometimes occur of its rapidly fatal termination when proceeding from acute visceral inflammation, particularly from inflammation of the substance of the liver, and when accompanied by depressed vital power, much fever, and a very frequent pulse. I have seen death occur as early as the fourth day in such circumstances. The darker forms generally proceed more rapidly, especially to an unfavourable issue, than the lighter shades of the complaint. But the duration of it entirely depends upon the constitutional powers of the patient, and the pathological conditions which occasion it.

9. *D.* Terminations.—Jaundice, like most other diseases, terminates in three ways. 1st. In a return to health; 2d. In some other malady; and, 3d. In death.—*a.* Restoration to the healthy state generally takes place without any apparent crisis, although a critical evacuation is sometimes observed. As soon as biliary obstruction is removed the stools become darker, the urine paler, and the discoloration of the skin begins to disappear, the parts first changed being the first to regain their healthy hue. The *critical evacuations* are *bilious diarrhœa*, very

abundant *perspirations*, *hæmorrhoids*, and *menorrhagia*. In a case which I lately attended the jaundice rapidly disappeared after the discharge of a blackish inspissated bile, which had evidently accumulated in the hepatic ducts and gall-bladder for a long time. The quantity of this pitchy or tar-like matter which was evacuated was surprising, furnishing a striking instance of the black bile of melaina of the ancients.

10. *b*. In other cases the disease either acquires increased intensity or assumes a modified character; one of the varieties hereafter to be particularized occasionally changes into another. In some instances additional disorder is superaded, a severe or dangerous *complication* thus resulting; and in others, the jaundice disappears, but is replaced by another malady. Lethargy, coma, apoplexy, epilepsy, phrenitis, diarrhœa, cutaneous eruptions, inflammation and abscess of the liver, disease of the spleen or of the pancreas, dropsy, rheumatic attacks, &c., may thus supervene, the jaundice still persisting; and ascites, anasarca, dysenteric attacks, abscess of the liver, and chronic enlargement of the spleen may follow upon its disappearance. Jaundice is often, also, a symptom of inflammation and abscess of the liver; although these latter are sometimes consequences of the pathological state upon which this affection depends, particularly when they appear subsequently to it. But it is much more frequently a symptom merely, and is oftener consequent on, than antecedent to, or coetaneous with, inflammation or abscess of this organ. Indeed, chronic inflammatory action, or active congestion of the substance of the liver, giving rise to jaundice, is more common, and antiphlogistic means are much more frequently required for the removal of it, than is supposed.

11. *c*. The termination in death may be preceded by the morbid states now enumerated, particularly when they assume their worst forms; or it may be ushered in by increasing and urgent depression; by sinking of vital power; by great despondency; by ascites or œdema of the lower extremities, or both; or by hydrothorax; by great emaciation, hectic fever, and total loss of the digestive and assimilating functions, and by irritability of the stomach. In some cases it has given rise to lethargy, coma, apoplexy, palsy, convulsions, or delirium previously to a fatal issue. It occasionally happens, as observed by Drs. Cheyne and Marsh, that persons labouring under jaundice, whose nervous system has been previously injured or greatly exhausted, are suddenly seized with cerebral symptoms, and die either phrenitic, or apoplectic, or in convulsions. But death by the sudden occurrence of coma, which becomes more and more profound, is the most common. Delirium, also, often precedes a fatal termination.

12. *E*. Forms and States.—Jaundice may be considered as *idiopathic* when it supervenes suddenly upon violent affections of the mind. It is *symptomatic*—its common form—when it proceeds from diseases of the liver and biliary apparatus, or from obstruction of the common bile duct, or from lesions of adjoining parts, &c. To these some authors have added a third form, which they have termed *critical*. Grimaud states that it has occurred as a crisis in some fevers, and Bianchi makes a similar remark, at the same time stating that when jaundice is critical the urine is almost or altogether natural, while in its symptomatic form it is generally of a deep yellow, and otherwise much changed.

13. Jaundice may present various *degrees of severity*. It may be accompanied with great febrile excitement, and thus assume an *acute form*, and quickly arrive at its termination. When this is the case, it is generally accompanied with active hepatic, or other visceral disease, and often passes into a very deep or greenish hue. I was recently called to a gentleman, aged about fifty, of a strumous diathesis, who had begun to ail the previous day. I found him slightly jaundiced, remarkably depressed in spirits, with a sensation of sinking at the epigastrium, the pulse being upward of 120, and soft. The evacuations were at first clay-coloured and costive, but they soon became copious, black, and tar-like. Delirium appeared on the following day; spontaneous hæmorrhage from the bowels occurred, followed by coma, relaxation of the sphincters, and death on the fourth day. The jaundice progressively increased, and on the third day the surface had become a greenish-brown. The friends would not allow the body to be inspected.

[It is worthy of note that death from jaundice is preceded by *delirium*, *spasms*, and *coma*, and that this is not explained by anything found on dissection in the brain; indicating that the retained *bile*, like retained *urea*, acts as a narcotic poison on the nervous system. When we consider that, in cases of jaundice from obstructions of the ducts, where there is much bile absorbed into the blood, and no cerebral effects follow, except, perhaps, drowsiness, we are led to infer that *retained* bile is far more injurious than that which is *reabsorbed*, and probably altered in that process.]

14. Jaundice may also proceed in an extremely *mild form*, or with but little constitutional disturbance, the appetite, pulse, and mental powers being scarcely affected; and in this form it may continue long, or soon disappear, sometimes after very inefficient means of cure, or even without the use of any medicine. The liability of the disease to recur from slight causes, as errors of diet, intemperance, &c., has sometimes given it an apparently *periodical* character, which, although contended for by some authors, is entirely accidental, or, at least, the consequence of a concurrence of several of its causes at certain seasons or periods, especially in situations abounding in the sources of endemic maladies.

15. II. Causes.—i. The *Predisposing Causes* are indolence, dissipation, intemperance, and sedentary occupations, particularly those performed in a stooping posture, and with pressure on the hypochondria and epigastrium. Jaundice is not infrequent among the studious, and especially among those who are harassed by cares, disappointments, and the depressing passions, and whose nervous energies are exhausted. It seems, also, more frequent in hypochondriacal and hysterical persons, and those who neglect, or are deprived of, their usual active engagements. It is common to all ages and sexes. Heberden found that out of 100 successive patients with this disease, 52 were

males. It is frequently met with in cooks and bakers, and in workmen exposed to high ranges of temperature, or addicted to intoxicating liquors. In females it is oftener observed during pregnancy, and after the cessation of the catamenia, than at other epochs.

16. ii. The most common *Exciting Causes* are the more violent mental emotions, as the sudden communication of distressing intelligence, fright, terror, rage, anger, grief, anxiety, despondency, losses and disappointments, jealousy, petulance, peevishness, and irritability of temper. I have known it to follow the communication of joyful intelligence. Particular kinds of ingesta, especially such as disagree with the digestive organs, as stale, unseasonable, and unwholesome fish; drinking cold fluids when the body is perspiring; cold applied to the feet and surface of the body after exertion, or during free perspiration; and the bites of animals, particularly those which are venomous, also occasionally produce jaundice, especially in those who have experienced a former attack. According to Hoffman, venereal excesses, and intemperance in the use of intoxicating liquors, are among the chief causes of the disease. Great debility and exhaustion of the nervous energies, and, as clearly demonstrated by Dr. Cheyne and Dr. Marsh, mercurial courses, particularly when employed in hospitals and close apartments, sometimes occasion it. I believe, however, that mercurials are a cause only when they are given to produce their specific effects, or when the exhibition of purgatives has been neglected when required. The prevalence of the disease during revolutions, invasions, sieges, and campaigns has been remarked by many writers; and its occurrence after intemperance in eating or drinking must be familiar to all. The excessive use of coffee; austere, and acid, or unripe fruits; and, indeed, any error of diet, or deleterious substances received into the stomach, will sometimes produce it. The suppression of accustomed discharges and eruptions, and the retrocession of rheumatism and gout, also, not infrequently occasion it.*

17. When the pathological conditions of the biliary and digestive organs exist, with which this disease is most frequently connected, many causes that, under different circumstances, would produce but little effect upon the system, will readily excite it. Severe pain, mental affections, an irritating purgative, or particular kinds of food will sometimes be sufficient to give rise to an attack, especially when pre-existing disorder of the biliary organs is associated with great nervous exhaustion. Jaundice is not infrequently caused by obstructed circulation through the heart, and by a torpid state of the cæcum and colon, with accumulations of fæces and scybala in their cells. It often follows agues and other periodic fevers, and it then usually depends upon some one of the morbid states of the liver already noticed. It often occurs in the course of bilious remittent fevers, and occasionally without any apparent diminution of the biliary discharge, and even with evidence of augmented secretion of bile. It is, also, often associated with dysentery, or with other diseases, as will be shown in the sequel.

18. III. The Morbid Appearances most frequently found in persons who have died *with* jaundice are the following: *a.* The *surface of the body* generally preserves the same colour after death as previously to dissolution. Portal and myself, however, have seen the intensity of colour diminished; and, in other instances, the skin of some subjects, who had never had jaundice, assume, after death, a deep yellow. The limbs are often flexible, and œdema of the extremities is not infrequent. The body is commonly emaciated. The serum in the œdematous limbs, as well as that in the internal cavities, is either of yellowish tint or of a dark hue. The various structures are more or less tinged of the same hue, particularly the cellular, adipose, and serous tissues. The internal surface of the blood-vessels, and even the cartilages, tendons, periosteum, and bones, are sometimes also changed in colour. The muscles are often tinged, and softer and more flaccid than natural. Morgagni had remarked that the substance of the lungs, heart, liver, kidneys, and spleen is often softened, and contains a yellowish, a greenish-yellow, or reddish fluid; and subsequent observers have also noticed these appearances. Most of the *secretions* partake of the same tinge; and the serum of the blood is also similarly altered. The fluid effused into the ventricles of the brain and all the membranes are thus changed; but the substance of the brain itself, and the humours of the eye, are generally of their natural colour.

19. *b.* The *liver* and its appendages, most frequently of all the viscera, present morbid changes. The liver itself has been found with all the lesions consequent upon every form of inflammation. It is sometimes greatly enlarged, its blood-vessels congested, its ducts engorged, and its structure softened, inflamed, deeply tinged, or suffused with bile, and containing one or more abscesses, or their remains, &c. At other times it is extremely pale, apparently devoid of blood and of biliary secretion, atrophied, hardened, scirrous, and tuberculated. In one case it is changed to a white, parboiled state; in another, converted into a fatty steatomatous, tallowy, or adipocerous substance. Occasionally its ducts are loaded with green, inspissated bile, obstructed by concretions of cholesterine or of resinous matter. In other instances they are entirely empty, or contain merely a little thin, pale fluid. Sometimes the surfaces of the liver adhere to the adjoining viscera, and collections of matter or large abscesses press upon them, or upon the bile ducts, or open into the latter, or into other parts. In a few instances the *hepatic veins* have been found more or less obstructed, or pressed upon by tumours or enlargements of adjoining parts. In one instance of jaundice connected with abscess of the liver I detected inflammation of these veins, several of them being plugged up with lymph or filled with pus. In rarer instances, hydatids are found in the liver or attached to it. (See art. Liver.)

20. *c.* The *gall-bladder* often contains *calculi*, the number and size of which are very various. When one only is found, it is usually very large. The gall-bladder may be distended with *bile*; in

* [The reader will find some remarks on *jaundice* and its *causes* under the articles "Drunkenness," "Duodenum," and "Gall-bladder and Ducts," which he may, in this connexion, profitably consult (p. 786, 795, 796, vol. i.; p. 2, vol. ii.)]

this case the fluid is much changed, being generally of a deep green colour, or greenish black, thick and ropy, and sometimes containing granular matter. In some instances the accumulated fluid is of a pale orange colour, and thin consistence. A portion of fluid of this description, which was taken from a subject dead of tuberculated liver, jaundice, and dropsy, was examined by Dr. Bostock, and found to consist of water, albumen, and a little colouring matter, without any of the usual biliary principles. Stoll found the gall-bladder filled with a whitish serum. In other cases it is entirely or nearly empty. Sometimes marks of inflammation are observed in its coats. The last-named author found them changed to a semi-cartilaginous state. Frank, Louis, and Andral met with ulceration of the internal surface, with softening of the coats of the gall-bladder; and a similar case occurred to myself, where it contained gall-stones. Andral found it softened and ruptured. Excrescences into its cavity have been noticed by Bonet. Adhesions of it to the adjoining parts are occasionally observed. Its entire absence in this disease occurred to M. Bourgeoise; but this is merely a coincidence. In a case of absence of gall-bladder in a patient at the Infirmary for Children, there was no jaundice; and similar facts have been observed by others.

21. *d.* The *biliary ducts* are frequently obstructed, in some cases by gall-stones, in others by the pressure of tumours in the pancreas, mesentery, pylorus, or duodenum. The common duct is not infrequently obstructed by scirrous or other tumours in these situations. In this case, as well as when it contains calculi, the gall-bladder and the duct above the seat of obstruction are generally greatly dilated, and filled with thick, dark-coloured bile. This dilatation sometimes extends more or less throughout the ramifications of the hepatic ducts. In a case which occurred in my practice some years ago, and where both the common and the pancreatic ducts were completely obliterated by their inclusion in a large, hard, or scirrous tumour, developed between the root of the mesentery and head of the pancreas—this latter being remarkably enlarged—the gall-bladder contained about twelve ounces of this kind of bile, and the ramifications of the ducts through the liver were much dilated. The coats of the ducts sometimes exhibit marks of inflammation—are ulcerated, thickened, and indurated, and the caliber of their canals are much reduced. In some instances the ducts are entirely obliterated, and reduced to a thin fibro-cellular cord. This obliteration I have seen confined in one case to the common duct, in another to the cystic duct. In the latter instance, the gall-bladder was enormously distended with a deep green viscid bile: the obliteration of the duct must have been subsequent to the accumulation of the secretion in this reservoir. Stoll, Portal, Andral, and others observed a cartilaginous state of both the common and cystic ducts. Lieutaud, Ludwig, and Chapman found lumbrici in the common duct in icteric patients.

22. *e.* The *stomach* is not infrequently seriously altered, particularly when the disease has been occasioned by intemperance, especially in the use of spirits. The pylorus in those cases is sometimes thickened, cartilaginous, and greatly constricted (Stoll). The *duodenum* is often, also, the seat of lesion, especially in the vicinity of the ducts. It is sometimes inflamed, thickened, softened, or indurated, ulcerated, and, in rare cases, apparently scirrous. Tumours of various kinds have involved its coats at the place where the ducts enter it, either entirely obliterating their apertures or very greatly diminishing them. Orchy found this viscus remarkably dilated, so as to press upon the ducts. The *pancreas* is occasionally enlarged, scirrous, or otherwise altered, pressing upon or obstructing the ducts. Great enlargement of the *right kidney* has also produced this effect. The *spleen* is sometimes enlarged, or otherwise altered.

23. *f.* Alterations of the *vena portæ* are also met with in jaundice. M. Honoré found this vessel nearly impervious. It has been observed considerably enlarged throughout its ramifications, and congested with black blood. In a great number of icteric cases, the viscera adjoining the gall-bladder are much stained by the exudation of bile through its coats. But this is an entirely *post-mortem* appearance. *Dropsical effusions* into the various cavities are frequently met with, and occasionally coincident lesions in the *heart, lungs*, as well as in some one or more of the abdominal viscera.

24. It should not be overlooked that each or several of the foregoing lesions have often been present without jaundice, a circumstance which has led some pathologists to deny the origin of it in the presence of bile in the circulation; and that jaundice has existed in patients in whom no organic lesion was detected after death: an occurrence which has led physicians, since the times of Hoffmann and Morgagni, to impute the disease, in some cases, to spasm of the biliary ducts, and induced others to view it as an occasional consequence of the accumulation in the blood of the materials of which bile is formed, owing to inaction of the liver. But there is every reason to suppose that undetected disease of the heart had existed in many of these, and had obstructed the return of blood from the liver.

25. In cases of jaundice, particularly in those of long standing, a yellow or greenish yellow tint, in different degrees, is usually observed in every texture and organ of the body, and in all the fluids and secretions, whether natural or morbid. The fat is usually of the deepest colour. The humours of the eye and the cornea are seldom or never tinged. A case is, however, related in Horn's *Archives* (*Für Pract. Medicin.*, b. vi., p. 341) where they exhibited this change of colour. The yellow hue has rarely been detected, either in the cerebral structure or in the medullary tissue of the nerves, although instances have occurred to Bartholin, Morgagni, and Portal of its appearance in the former.

[Professor Gross remarks that "the blood, in jaundice, is more or less altered in its properties. Not only the colouring principle of the bile, but even the resin of this substance, has been detected in the circulation; and as a necessary consequence, especially when the disease is of long continuance, every tissue of the body assumes a yellowish tinge, as well as, in many cases, the different secretions. In

four subjects that I have had occasion to dissect within the last five years, all the soft parts, together with the whole of the osseous and cartilaginous systems, were of a deep orange complexion from this cause. Even the brain participated in the change, for its substance was by no means of so clear a white as in the healthy state. When the bile is thus introduced into the general circulation, it appears to act as a sort of narcotic, inducing drowsiness and irritability. In other cases it generates fever, with headache, nausea, and loss of appetite. It should be observed that the presence of this fluid may be easily detected in the serum of the blood by adding to it an equal quantity of sulphuric acid, diluted with twice its bulk of water. The serum, as has been stated by Dr. Babington, will thus change its yellow straw-colour for the characteristic green tint of bile."—(*Elements of Path. Anat.*, vol. i., p. 226.)]

26. IV. Of the Pathological Relations of Jaundice.—Jaundice is more or less intimately connected with one or other of the following pathological conditions: 1. With an exuberant secretion of bile; 2. With inflammation and abscess of the liver; 3. With congestion of the liver and portal system; 4. With chronic alterations of the structure of the liver; 5. With spasm, or temporary obstruction of the gall-ducts; 6. With the passage or existence of gall-stones; 7. With inflammation, obliteration, or compression of the biliary ducts or gall-bladder; 8. With inflammation of the duodenum.

27. i. *Jaundice with Exuberance of Bile.*—This variety was first contended for by M. Portal, and afterward by MM. Cornac, Alibert, Villeneuve, and others. It has been referred to an excited state of the vital actions of the liver, particularly to the predominance of its secreting function. It is sometimes met with in temperate climates during summer and autumn, especially those which approach nearest the tropics; but it occurs chiefly in warm or intertropical countries, and in those who live indolently and luxuriously or intemperately, or who are of a bilious temperament. It is generally preceded by supra-orbitar headache, bitter taste in the mouth, loss of appetite, nausea, bilious vomiting, followed by a yellowish or greenish-yellow tint of the skin. The chief characteristic of this form of the disease is the absence of constipation, and the presence of bile in the evacuations, which are either natural or more frequent than usual. I have seen it accompanied with slight bilious diarrhœa, with febrile action, or with a full or strong pulse. It may be presumed that a portion of the bile is absorbed in this variety during its course through the biliary passages, or through the intestinal canal, owing either to increased activity of the absorbing vessels, to the state of the bile itself, or to partial obstructions in its course through either of these parts. It is often complicated with dysentery, hepatitis, and bilious fevers, particularly in miasmatous and intertropical countries.

28. ii. *With Inflammation and Abscess of the Liver — Hepatic Jaundice*, Sauvages and Cullen—*Icteritia Pyrexica*, Alibert. Jaundice may accompany any form of inflammation in this organ, particularly when the internal structure is the seat of the morbid action. Although inflammations of the liver are so extremely frequent in India, yet jaundice is a comparatively rarer attendant on them there than in this country. In Continental countries this association of jaundice is very common. The rare occurrence of jaundice as a symptom of hepatitis in India is perhaps owing to the liberal use of calomel in the treatment of hepatic affections.* But it is when abscess forms in the liver that we most frequently find jaundice supervene on hepatitis. In a very large proportion of the cases of abscess of this viscus, detailed by M. Andral (*Clinique Médicale*, t. iv.), jaundice appeared; and a similar frequency of connexion has occurred in my own practice. Out of six cases of abscess of the liver to which I was called in 1826 and 1827, in consultation, four had jaundice during some period of their progress, subsequently to the occurrence of the symptoms indicating the formation of matter.

29. In almost every case of jaundice from inflammation or abscess of the liver, the nature of the disease is very readily recognised. The symptoms of hepatitis are well marked, particularly the pain, uneasiness, and tumefaction in the right hypochondrium and epigastrium; the scanty, dark, or brownish urine; the dry cough; the pain in the right shoulder, clavicle, and side of the neck, or under the right scapula, &c.; and the full and frequent pulse, &c. (See Liver—*Inflammation of*, and *Abscess of.*)

30. iii. *Jaundice from Congestion of the Liver — Intemperies calida* of Sennert — *Icterus a Plethora* of F. Hoffmann.—The connexion of this state with jaundice has been admitted by Sauvages, Grimaud, Bang, Portal, Cornac, and Manoury. It is generally observed in persons of the bilious and sanguine temperaments, who live luxuriously or intemperately, and either pursue sedentary occupation or are deprived of requisite exercise. It is chiefly to this and the preceding pathological states that we are to refer the instances of jaundice which take place from the suppression of the menses, or of accustomed discharges, particularly the hæmorrhoidal, and from the retrocession of gout and rheumatism. Active congestion of the portal vessels is connected with more or less plethora, and congestion of all the vessels that convey blood into the vena portæ. The blood circulates with difficulty through the liver, and the bile, which is formed generally in great abundance, owing to the highly venous state of the blood, often is retarded and accumulated in the ducts during its course to the gall-bladder or duodenum. Owing to this retardation or obstruction, a portion of it is absorbed, probably by the radicles of the hepatic veins, as they pass out of the granular structure, where the biliary secretion is performed and the ducts take their origin. It is obvious that obstructions of the return of blood from the liver, owing to *organic lesion of the heart*, will also give rise to this form of the complaint, and that such occurrences are not rare.

31. iv. *With Chronic Organic Alterations of*

* [The late Dr. Hosack, on the other hand, during the latter part of his life, attributed the frequency of jaundice in this country to the excessive use of mercury in the treatment of fevers, hepatic affections, &c.]

the Liver—Aurigo ab Obstructione, Sauvages—*Icteritia Apyrectica*, Alibert.—In this form of the disease the accession of the jaundice is generally very slow; the colour is livid or dusky, permanent, and often extremely deep, approaching sometimes a greenish or olive hue, forming the green or black jaundice of several authors. The organic alterations vary remarkably, consist of those already enumerated (§ 18, *et seq.*), and are often complicated with lesions of the adjoining viscera, or with dropsical effusions. In the majority of these cases, the bile seems either to be secreted with morbid properties, and to be conveyed into the circulation almost as soon as it is secreted, or, what appears still more probable from the morbid appearances very frequently detected, the materials of which bile is formed are not combined by the liver, and converted into bile, but. having experienced the preparatory change, merely pass onward from the granular structure of the liver into the radicles of the hepatic veins, and, circulating with the blood, tinge the textures of the body, particularly the rete mucosum. That there is sometimes no due secretion of bile is shown by the secreting structure of the liver being often found either completely destroyed, or so altered as not to admit of the demonstration of its peculiar texture; and also by the pale, straw-coloured, tasteless, and albuminous serum found in the ducts (§ 19), or by their empty, atrophied, and pale states. This variety of jaundice is generally the consequence of intemperance, or of residence in miasmatous districts, or in warm climates. It is often observed in persons of middle age, or somewhat farther advanced in life; and is preceded by chronic dyspepsia or bowel complaints, and by indications of disorder in the liver, often of many years' duration.

32. v. *Jaundice from suspended Function of the Liver, or from Spasm of the Ducts—Icterus a Spasmo*, Hoffmann.—That jaundice ever proceeds from spasm of the gall-ducts has been denied by several writers. Cullen, Powell, Andral, and Jourdan have, however, contended that spasm of the ducts sometimes occurs, and produces the disease, especially in cases arising from mental emotions, and the irritation of the upper portion of the intestinal canal. Sudden mental affections—as fright, terror, rage, anger, disappointment, excessive joy—frequently occasion a most painful and oppressive sensation at the epigastrium, faintness or difficulty of respiration, and paleness of the countenance. This state is occasionally followed almost instantly, but always in a very short time, by yellowness of the face and surface of the body. In some cases the functions of the brain are much disturbed, and a febrile state of the system takes place. In others, nausea, vomiting, &c., in addition to the icteric affection, are produced. In these, the moral affection influences the state of the nerves proceeding from the solar plexus, and hence the morbid sensations referred to the epigastrium. The slow, depressing passions of the mind were also supposed, particularly by Villeneuve and Manoury, to occasion spasm of the ducts; and physical pain was considered by M. Portal occasionally to operate in a similar manner. When jaundice is connected with hysteria, epilepsy, or hysteralgia, Hoffmann referred it to the same cause. Even the bites of venomous reptiles were supposed by Mead and Bosquillon to produce icterus in a similar way. Bartholin, Lanzoni, and Van Swieten have imputed the rare occurrence of jaundice from the bites of dogs or other animals also to this circumstance.

33. Cases of this kind admit of a different explanation from that proposed by the above writers. It is more probable that violent mental emotions, and that sedative poisons taken into the stomach, or inserted into the tissues, suspend the organic nervous influence, and thereby arrest the functions of the liver, than that they occasion spasm of the ducts and adjoining parts. That this latter state, however, may occur I will not deny, especially when nausea, retchings, or vomiting are added to the icteric affection, or when the duodenum is irritated in the vicinity of the ducts. The more or less complete paralysis of the biliary organs, produced, for a time, by the causes alluded to above, favours the absorption or passage of bile into the circulation, and the accumulation in the blood of the elements of which bile is formed.

34. The principal characteristics of this variety of jaundice are its rapid appearance and short duration. It is seldom deep, and generally is of a pale yellow, or bright yellow hue. It often disappears without the aid of medicine, and the treatment resorted to in such cases thus obtains a reputation it does not deserve.

35. vi. *With Inflammation and Obliteration of the Ducts and Gall-bladder.*—The ducts may be inflamed, and obstructed in consequence of the turgescence accompanying the inflammation, or, as MM. Jourdan and Breschet have stated, of some degree of spasm attendant on it. The inflammatory action may also extend to the gall-bladder, or be almost entirely limited to it. Inflammation and its consequences have been observed after death in one or other of these situations, both in connexion with, and independently of jaundice; and have most probably been induced by the irritating properties of the bile passing through the ducts, or by the extension of inflammatory action from the internal surface of the duodenum to that of the common duct. In either circumstance the ducts above the obstruction may become dilated, although not to the extent observed after obstructions of a more permanent kind. If, however, the consequences of inflammation furnish a permanent obstruction, this result will often occur.

36. In cases of this kind the patient has more or less fever, dry skin, thirst, and anorexia or nausea, or even retchings. Pain is felt in the right hypochondrium, particularly under the exterior and inferior angle of the right shoulder blade, extending to the epigastrium, on the right side of which, or beneath the extremities of the right false ribs, a pyriform moveable tumour is sometimes felt. The stools are without bile. More or less fulness of the right hypochondrium and epigastrium is also often present, sometimes with pain not only in the above situations, but also in the back and in distant parts. These symptoms may continue an indefinite period with various degrees of severity, and may subside with the jaundice after a time, upon the resolution of the inflammation.

37. In less favourable cases, owing to the thickening consequent upon the inflammation, or to the exhalation of coagulable lymph from the internal surface of the inflamed duct, together, perhaps, with spasm, its canal becomes permanently obstructed, and the vessel is ultimately reduced to a fibro-cellular cord. In these the jaundice generally continues, and all the digestive and assimilating functions languish, death ultimately taking place.

38. vii. *Jaundice from Compression of the Ducts by Tumours, &c.*—The lesions of the adjoining viscera already referred to (§ 21), particularly the formation of scirrous and other tumours in the pancreas, pylorus, mesentery, &c., involving and obliterating the ducts; enlargement and disease of lymphatic glands in the vicinity of the common duct; engorgement or inflammation of the pancreas, occasioning compression of this duct; great enlargement of the right kidney; distention of, or accumulations of hardened fæces in the cæcum and colon; the gravid uterus, &c., may occasionally interrupt the passage of bile into the duodenum, by pressing upon the ducts, and thus occasion jaundice. It is only by pressing scybala, or hardened fæces lodged in the cells of the colon, upon the duodenum and common duct, that the gravid uterus causes jaundice. It is extremely difficult to ascertain the presence of any of those causes during the life of the patient, although suspicions of the existence of some of them may be entertained from the *tout ensemble* of the symptoms, and the effects of remedies. When jaundice arises from accumulated fæces, the effects of purgatives will often demonstrate its origin. The frequency of this cause has been justly insisted on by VAN SWIETEN and others.

39. viii. *Jaundice from Calculi in the Ducts —Aurigo Calculosa*, SAUVAGES.—Calculi lodged in the ramifications of the hepatic duct may occasion, or, rather, be connected with jaundice; but their presence in the common and cystic ducts is a more frequent cause. They are more rarely found in the hepatic duct, but they may produce the disease in that situation. Their impaction in the cystic duct, even when the gall-bladder is filled with dark bile, does not uniformly occasion this affection, as shown by numerous observers. When they obstruct the common duct for some time, this effect very generally, although not always follows; and the symptoms, particularly when the calculus approaches to, or is passing through the coats of the duodenum, are often very well marked. In many cases, however, calculi pass without giving rise to jaundice, or, indeed, to any very prominent symptom or ailment; and in others they pass with violent sufferings, and yet no jaundice is occasioned.

40. More commonly the occurrence of jaundice from the impaction of calculi in the bile ducts, particularly the common duct, is attended with pain, weight, pressure, and uneasiness towards the epigastrium, especially when the patient lies on the left side. Acute, colicky, and spasmodic pains are felt at intervals in the region of the duodenum, under the right shoulder blade, and extending to the hypochondrium and epigastrium, followed sometimes with nausea, vomiting, and a sense of heat at the stomach. Occasionally a tumour is detected between the epigastrium, hypochondrium, and umbilicus. When the fits of pain are violent, the patient often complains of vertigo, of the extension of the spasm to the abdominal muscles, and even to the extremities. There is seldom only one calculus, generally several; and the attack is often renewed upon the passage of each, with a varying degree of severity according to their size. The jaundice in these cases may precede, or even follow the painful symptoms. Upon the discharge of the calculi these symptoms quickly subside, but the jaundice disappears only slowly, or even persists for some time.

41. The production of jaundice by the presence of *worms in the ducts* has been stated by several authors, and doubted by others. Dr. CHAPMAN refers to a preparation demonstrating the fact in the museum of the University of Pennsylvania.

42. ix. *Jaundice from Inflammation or Congestion, &c., of the Internal Surface of the Duodenum.*—Various deleterious ingesta, acrid salts and poisons, emetics, and purgatives, articles of food which offend the stomach, drinking cold fluids, &c., when the body is overheated, or exposure to cold, have been supposed by BROUSSAIS and his followers sometimes to occasion so much inflammation and turgidity of the mucous membrane of the duodenum and adjoining parts, particularly about the orifice of the ducts, as entirely to occlude it, and thereby to give rise to jaundice. That this takes place in rare cases, or that congestion in this situation will have the same effect, may be admitted, although satisfactory proofs of the circumstance cannot be readily furnished. The inflamed and turgid state of the duodenum may be limited to it, or may even extend to the ducts, as stated above, and thus cause obstruction (§ 35). The jaundice accompanying bilious fevers and dysentery may depend upon this pathological state.

43. It is probable that this variety of jaundice will be attended by very nearly the same symptoms as characterize that proceeding from inflammation of the ducts; but that, unless the ducts become implicated, the jaundice will be less marked, and of shorter duration than when they are inflamed. The presence of nausea, vomiting, or of diarrhœa, or of sympathetic phenomena in such cases furnishes but slight evidence of this pathological state. OECHY states that he has seen the duodenum dilated so as to press upon and obstruct the ducts in a case of jaundice, but there was probably some other lesion upon which the jaundice more immediately depended than upon this.

44. Various other morbid states of the duodenum may occasion jaundice, particularly the accumulation of mucus on its surface, or about the orifice of the ducts; and various organic lesions seated in this part, or extending to it, or to the ducts from adjoining viscera. The former of these is probably not an infrequent cause of the slighter and less enduring kinds of jaundice, particularly in infants (§ 53), children, and young persons.

45. V. JAUNDICE FROM SUSPENSION OR ARREST OF THE SECRETING FUNCTION OF THE LIVER—*Pseudo Jaundice.*—In this form of disease, which cannot be considered as a variety of true jaundice, bile is not secreted or formed from its elements in the blood, owing either to a

paralyzed or suspended state of the vital action of the liver, or to disorganization of it to an extent entirely subversive of its functions. In either case the elements from which the bile is formed accumulate in the circulation, change the colour of the serum and of the blood generally, and thus render the skin lurid or murky. In a farther advanced stage of the disorder, certain of the principles, or even the colouring matter of bile, are fixed, or deposited, in the tissues, imparting to them either a darker or a more jaundiced hue. (See art. DISEASE, § 108.) The slighter states of this form of disorder frequently accompany torpor of the liver, as observed in this country; and the more marked states of it often occur in miasmatous and warm climates. In various fevers also, and in some epidemics and pestilences, the action of the liver is entirely suspended, the surface becoming dark or lurid. This takes place to a remarkable extent in *pestilential cholera*, and is heightened by other circumstances. When this state of disease arises from disorganization of the liver, its accession is slow, and the discoloration of the surface often proceeds through a dirty or lurid hue to the greenish or greenish black colour about to be noticed. In either of the pathological states producing the discoloration there is an entire absence of bile from the stools; and the secretions from the kidneys and skin are dark, or otherwise altered, from the presence of the elements or of the principles of bile. When the vital power of the organ is suspended, there is seldom pain or other prominent symptom detected in the region of the liver. There is even sometimes an unusual absence of symptoms indicative of acute hepatic disease, excepting the complete suspension of the functions of the organ. But when the structure of the viscus is so altered as to be incapable of discharging its offices, the antecedent disorder, as well as the attendant phenomena, will generally indicate the pathological relations of the affection, aided by the history of the case, and a knowledge of the causes. The alterations of the liver, already noticed in connexion with true jaundice (§ 19), will occasionally, when carried to the highest pitch, give rise to this form of the disease, or to the next to be noticed (§ 46).

46. VI. OF GREEN OR BLACK JAUNDICE—*Μελαινα νοῦσος*, Grec.—*Icteritia nigra*, FORESTUS—*Icterus viridis*, *Melas Icterus*, *Melanchorus*, FENNEL, et Var. Auct.—*Icterus Melæna*, GOOD—*Green Jaundice*, BAILLIE—*Black Jaundice*.—This is merely the extreme grade of the disease. It was first described by ARETÆUS; but although somewhat circumstantially noticed by several authors, the first satisfactory account of it was furnished by Dr. MARCARD and Dr. BAILLIE. The colour of the skin varies in depth from a yellowish green to a deep green or olive colour. The temperature of the surface is not increased, but burning heat is felt in the palms of the hands and soles of the feet. The evacuations are often pale, but sometimes they are dark coloured, pitchy, with grumous coffee or chocolate-like matter, and slight diarrhœa. The urine is occasionally clear, but oftener very dark and loaded, tinging the linen of a dark, tawny hue. The patient is greatly depressed, physically and morally, and complains of anxiety at the epigastrium, and of tenderness either in that situation, or in one or both hypochondria. A sensible enlargement of the liver is often felt, and sometimes also of the spleen. In a case which I lately treated, both these viscera were very remarkably enlarged. But an opposite state as frequently obtains. The pulse is usually natural or slow. Vertigo, sickness, and vomiting of a green, acid colluvies occasionally are present. In the intervals, the appetite is either capricious or but little affected.

47. This form of jaundice seldom attacks young persons. It is commonly met with in the aged or advanced in life, and is much more frequent in males than females, particularly in those who have lived long in unhealthy intertropical countries, or who, with great anxiety and fatigue, have been tried by frequent changes of climate. It is generally connected with the most chronic and profound organic lesions of the liver, especially those which involve or destroy its secreting structure, and obliterate the minuter ramifications of the ducts through the organ. It seldom admits of more than a partial removal, but terminates in either a fatal exhaustion, or with coma, apoplexy, epilepsy, or palsy. Abdominal dropsy frequently takes place in its progress. Its course, in its slighter grades, is generally slow, sometimes continuing, with various fluctuations, for seven or eight years; but when the colour becomes very deep, it often terminates rapidly in either of the above ways.

48. When green jaundice is attended with pitchy, or dark, grumous evacuations, there is generally either a congestion of the spleen, and of the portal system of vessels, with the secretion of a dark green, unhealthy bile, a portion of which is absorbed and deposited in the structures, particularly in the *rete mucosum*; or a congested and hæmorrhagic state of the mucous membrane of the stomach, duodenum, and upper part of the intestines, owing to the obstructed circulation through the liver; but both pathological conditions may be present, giving rise to an exhalation of venous blood from this membrane, and thereby to the dark and grumous motions. The mucous membrane in these situations is usually found, on dissection, dark coloured, mottled, softened, ecchymosed, or its venous capillaries loaded. The other viscera, particularly the *liver* and *ducts*, present the appearances already described (§ 19, 20).

49. VII. COMPLICATED JAUNDICE.—By this appellation, I mean the occurrence of jaundice, 1, during the course of some other disease; and, 2, upon the subsidence or suppression of a pre-existing disorder, which may not only be concerned in its appearance, but also in its removal or recurrence.—*A. The maladies during the progress of which jaundice most commonly occurs*, are chiefly those fevers which implicate, in a more or less marked manner, the liver and digestive mucous surface. Thus it is frequently observed in the course of *gastric* and of *bilious remittent fevers*, of both an inflammatory or low character. It is also not infrequent in connection with *ague*, and owing partly to this circumstance, it has been said by some authors to recur *periodically*. Its appearance in the course of *typhus fevers* is comparatively rare. MENDE has sometimes remarked it; and CHEYNE notices its infrequency. When it occurs during *fevers*, it may be imputed either to dimin-

ished excreting activity of the liver, and the rapidity of absorption of a portion of the secretion, or to obstruction in the way of the opening of the ducts into the duodenum, from a tumefied, congested, or inflamed state of its mucous surface. In some cases both states may contribute, while in others the secretion takes place more rapidly than it is conveyed into the bowel, althoughi ts flow is in no respect impeded. The secreting function of the organ may also be much diminished, the constituents of bile being left in the blood.

50. We occasionally also observe jaundice in connexion with *organic lesions of the heart, hysteria, dropsy, melaina, delirium tremens, apoplexy, palsy,* and *epilepsy*. When it is complicated with *hysteria*, the urine is usually very abundant and limpid, and the complication is of a much less serious nature than with the other maladies just named, which more frequently terminate unfavourably when thus associated. When it occurs in consequence of interrupted circulation through the heart, dropsy, or hæmorrhage, often also supervenes. We also not infrequently hear of it in connexion with certain *cachectic* and *malignant affections* of a chronic character. Several of the states, which are usually attributed to jaundice, in the last stages of these maladies, are not true jaundice, and do not proceed from the presenee of bile, or of its constituents, in the circulation, but from the absorption and admixture with the blood, of a portion of the morbid matters formed in the seat of the local or malignant affection, or of some of the morbid secretions retained in the digestive canal (§ 54).

51. *B.* Jaundice sometimes follows the subsidence or suppression of other diseases, and is even removed by the reproduction of certain of them: it often appears after periodic fevers, and occasionally upon the sudden arrest of these fevers by large doses of cinchona or of sulphate of quinine, especially when these are exhibited before morbid secretions or accumulations have been evacuated. In such cases, the jaundice depends chiefly upon superinduced congestion or inflammation of the internal structure of the liver. The stoppage, also, of *hæmorrhoids* sometimes gives rise to jaundice, by inducing these morbid conditions of this organ, the re-establishment of the hæmorrhoidal flux generally removing the congestion, and favouring resolution of the inflammatory action. A similar result occasionally occurs from obstruction of the catamenia, and from suppression of dysentery, diarrhœa, of gout, and of rheumatism, especially when morbid secretions and collections in the digestive canal have not been removed. The relation of gout to several of the pathological states which give rise to jaundice, and the conversion, in some instances, of the one into the other, have been remarked by several experienced physicians; and a similar connexion has been noticed between this latter and the other diseases just named.

52. VIII. Traumatic Jaundice.—Jaundice sometimes occurs after concussion of the brain and severe injuries of the head. The influence which the brain exercises on the functions of the liver has been oftener the subject of remark than of explanation. It has usually been imputed to sympathy, or, in other words, the morbid relation has been stated, and our ignorance of its nature admitted at the same time. Severe injuries, when they suspend the energies of the brain, may also lower the secreting and excreting functions of the biliary apparatus, by diminishing its nervous energy, and placing it in a state which (§ 33) favours the absorption of bile into the circulation, independently of any very obvious change in the structure of the liver or ducts. There is, however, every reason to suppose that jaundice, subsequent to severe injuries, particularly of the head, sometimes results from phlebitis, originating in the seat of injury, or from the passage of purulent or other morbid secretions thence into the circulation. In either case, purulent collections will sometimes form in the liver, and give rise to jaundice by pressing upon the hepatic ducts and veins. Severe injuries in other situations than the head—as compound fractures, &c.—will sometimes also produce the same results. That purulent collections form in this viscus, under these circumstances, almost as frequently as in the lungs, is a fact fully established by the observation of the author and other pathologists; and although jaundice is not a constant, yet it is a very general attendant upon them. Injuries, wounds, &c., which implicate any part of the biliary apparatus, occasionally produce jaundice, by the immediate change they induce in the functions or structure of it; and it is not unlikely that, in some of the instances where the injury seemed to have been inflicted on the head, the liver actually had sustained the chief injury, or had experienced a concussion, of which jaundice was the consequence, either with or without inflammatory action diffused through the substance of the organ. When jaundice follows blows or injuries on the region or vicinity of the liver, and especially if it be attended by a dull or aching pain, inflammation extending through the substance of the organ may be inferred to exist.

53. IX. Infantile Jaundice—*Icterus Infantum—Icterus Neonatorum—Yellow Gum.*—Jaundice is usually slight during the infantile age. It is generally attended with languor, drowsiness, or debility, and may be referred to the following pathological states: 1st. To the stagnant and altered blood contained in the umbilical vein, changing the state or colour of the serum; 2d. To a partial absorption, from retention of the meconium; 3d. To saburræ accumulated in, and absorbed partially from the duodenum and small intestines; 4th. To obstruction of the aperture of the ducts from viscid meconium and mucous sordes; 5th. To spasm of the excretory biliary ducts (Beaumes); 6th. To a superabundance of the biliary secretion; and, 7th. To obstruction, or a paralyzed state of the secreting structure of the liver. The first, second, and third of the above sources may so change, or deepen the colour of the serum of the blood, independently of any absorption of bile, as to give rise to the yellow state of the cutaneous surface frequently met with in infants. Superabundance of the biliary secretion may exist in more than one respect; this fluid may be secreted in unusually large quantity, or it may have accumulated in the ducts and gall-bladder during the period immediately antecedent to birth, or it may have flowed into the duodenum in very large quantity, and mixed with the secretions of the digestive

mucous surface, forming a meconium, abounding more than usual in biliary principles, instead of the bland albuminous fluid which is usually formed for the purpose of assisting fetal nutrition and growth. A paralyzed state of the secreting structure of the viscus has been ascribed by M. Beaumes to injury sustained by the brain during child-birth, but it may exist independently of this cause. One or more of the above pathological states may give rise to jaundice in infants, which is generally mild, and readily removed by medicine. It usually occurs very soon, or within the first week, after birth, particularly when the bowels have been neglected; but it may appear at any period. When it comes on within the first week after birth, it seldom continues above four or five days, and is usually slight.

[There is good reason to believe that what generally goes under the name of *icterus neonatorum*, and appears a few days after birth, is not jaundice, and has no relation to the biliary organs. The surface of the infant, at birth, is frequently of a dark red, from hyperæmia, or congestion of blood; this gradually fades, very similar to a *bruise*, through shades of *yellow* into the genuine flesh colour; we speak here of that common discoloration not attended with any suffering or obvious disturbance of the bodily functions, and which soon disappears. Of course, new-born infants, like adults, are occasionally subject to genuine *icterus*, but not often. The yellowness may arise, in these cases, from some alteration in the serum of the blood, similar to what occurs in a bruise, when the more fluid part of the effused fluid has been absorbed, or to the simple increase of its natural colour. According to M. Billard, the orange colour which characterizes the disease, and which follows the deep red observable at birth, is the intermediate hue between the primitive red and the delicate rosy hue, or the permanent white of a child's complexion. It may be seen by pressing the finger on the skin so as to remove the blood, the skin then exhibiting a yellow tinge instead of white, showing its dependance, in some degree, on the quantity of blood circulating in the tegumentous tissue.]

54. X. Of Cachectic or Spurious Jaundice.—Morbid secretions readily pass into the circulation in the course of various malignant, pestilential, and cachectic maladies, and impart a dark or dirty hue to the serum, and otherwise affect the blood, producing a similar tinge in most of the tissues, the cutaneous surface closely approaching the colour of jaundice; but differing from it, in being more lurid and dusky, and in the absence of biliary obstruction. In low states of vital power, morbid secretions may be absorbed from the digestive canal, and thus affect the circulating fluids; and in a similar state of vital power, secretions or morbid matters in other situations, as from the uterus in the puerperal state, from abscesses, from disorganization of the cellular tissue, &c., may pass into the circulation, and impart a lurid or jaundice-like tinge to the external surface and other parts. The contamination of the fluids and soft solids in the latter stages of chronic malignant maladies, as carcinoma, fungoid disease, is also attended by a change of the cutaneous surface resembling jaundice, but essentially differing from it. For the hue of the skin in these maladies proceeds from the admixture of morbid matters absorbed from the seat of local mischief, vitiating and tinging the serum of the blood of a deeper hue, and thereby rendering darker the *rete mucosum*; and not from the presence of bile, or even of its chief constituents in the circulation (§ 63, *b.*). The lemon, yellowish, or even the yellowish-green hue of jaundice, is very different from the lurid, dirty, or murky appearance of the surface consequent on these maladies. In these the pale or clayey state of the stools, and the saffron tinge communicated by the cutaneous and urinary secretions in jaundice, are wanting, while the alvine evacuations are usually dark, morbid, and very offensive.

55. The appearance of the cutaneous surface in *chlorosis* resembles a slight attack of jaundice; and it is necessary not to mistake the one for the other. This will be avoided by attending to the age, the functions of the uterus, and to the evacuations. In chlorosis the discharges are more natural than in jaundice, the perspiration and urine not communicating to the linen the saffron tinge observed in the latter complaint. In chlorosis also, and, indeed, in the latter stages of chronic malignant diseases, the waxy state of the integuments, and the smallness of the vessels, indicate a deficiency in the quantity, as well as in the quality of the blood.

56. Instances, however, may occur in which the morbid colour of the surface is increased in the course of cachectic and malignant maladies, by the absorption of bile into the circulation, or by the accumulation in it of the elements or principles of which bile is formed, owing to torpor of the liver. Indeed, this latter cause of heightened discoloration of the surface, in the course of these maladies, is by no means rare; for the liver largely partakes of the depressed state of vital power characterizing them. When malignant disease occurs either in the substance of the liver, or in parts near the capsule of Glisson, it is generally associated with jaundice, which gradually deepens from a lemon hue to a dark or dusky green colour, the urine assuming a greenish brown tint, and the patient sinking from exhaustion and coma. This association has been well illustrated by the recent researches of Dr. Bright, which have appeared since this article was written.

57. XI. Of the Distinctions made by Authors.—Jaundice has been variously *distinguished*—into *Idiopathic* and *Symptomatic*; *continued* and *recurrent* or *periodical*; *febrile* and *non-febrile*; and into *Yellow* and *Black Jaundice*—*Icterus* and *Melasicterus*. It has been farther distinguished into *Inflammatory*, *Plethoric*, and *Nervous*; into *sporadic*, *endemic*, and *epidemic*; into the *mild* or *benign*, and the *malignant* or *pernicious*. Jaundice is generally *sporadic*; but it is *endemic* in some localities, particularly in those which are low, humid, and warm, and which abound in terrestrial exhalations, as in some situations in the south of Europe, and among Europeans residing in various parts within the tropics, particularly in the Eastern hemisphere. It has likewise been so prevalent at some periods, especially in autumn and early in winter, even in temperate countries, as to have been considered *epidemic*.

58. *The malignant* or *pernicious* form of jaundice noticed by writers sometimes occurs in warm climates, and in marshy districts in the south of Europe, particularly during autumn, when low remittent or bilious fevers are prevalent. It entirely depends upon a general or diffused inflammation, or inflammatory congestion of the liver, or both of the liver and spleen, with retention of the biliary and other secretions, great depression of vital power, deep or dark green discoloration of the skin, very quick pulse and febrile disturbance, terminating rapidly, sometimes with intestinal hæmorrhage, and always with delirium and profound coma. This form of jaundice is not, however, confined to the climates and localities just specified, as I have been called, within a short time, to two cases in London which presented all the characters of the most *pernicious* state of the disease, and which terminated fatally in four or five days.

59. *Idiopathic* or *primary jaundice* has been denied, first, by Boerhaave and Stoll, and subsequently by Pinel, Louyer Villermay, Grimaud, and others, while it has been contended for by numerous writers. The truth is, that the difference between idiopathic and symptomatic, particularly as relates to jaundice, is often merely verbal, and is in a great measure relative. In a very strict sense of these terms, jaundice is never a primary complaint; while it may frequently be viewed as such, if we consider it, with many other maladies, as constituting the principal, and one of the earliest morbid conditions which can be recognised by our senses. According to this more obvious mode of distinction, the occasional occurrence of idiopathic jaundice, as after mental emotions, cannot be disputed. The variety usually attributed to spasm of the ducts, but which I have considered as depending rather upon a change in the state of organic nervous influence and functions of the liver than upon spasm, may, conformably with this view, be considered idiopathic.

60. The *classifications* and *distinctions of jaundice* by nosologists and authors require no farther notice. Indeed, they do not deserve the space they would occupy, especially as Sauvages adduces *forty-six species*, arranged according to the various causes, pathological states, and associations which the complaint presents. Even Villeneuve has divided it into *thirteen species*, several of which are subdivided into many *varieties*, which do not admit of any distinction in practice.

61. XII. Prognosis.—The prognosis necessarily varies with the age, sex, temperament, and habit of the patient, and the pathological relations and complication of the disease.—*A.* It is generally more *favourable* in young than in old subjects, and in those in whom the energies of the frame are sufficient to bring about a return to the healthy functions, than in persons of a broken-down constitution, and with disorganized viscera. If it occurs in females from plethora, occasioned by the suppression of the menses, previous to the climacteric period; if the health has not been previously much affected; if the abdominal viscera betray no marked disease; if the respiratory function is unembarrassed, the heart's action regular and natural, and the vital energies not materially depressed; if the colour does not progressively deepen; if it proceed from the sudden and violent emotions of the mind, as anger, fright, &c., or from bodily pain; if it arise from articles of diet or of medicine, which have disagreed with the digestive organs; if it depend upon plethora of the portal system, without inflammation or abscess, or on the passage of calculi along the ducts in persons not far advanced in age nor greatly debilitated; if a repelled eruption or suppressed discharge return; if the alvine evacuations are not much changed from their natural colour, or when the biliary secretion reappears; if the discoloration originate in temporary obstruction or pressure on the ducts, as in pregnancy, distention of the duodenum or colon; if the epigastrium and hypochondria are not constantly painful, or tender upon pressure; and if the disease seems to proceed from the more temporary causes of obstruction in the duodenum, or from spasm, the prognosis may in general be *favourable*; yet I have seen jaundice exist in these circumstances, and where there seemed no reason to infer an unfavourable issue, and coma has suddenly appeared and quickly carried off the patient.

62. *B.* An *unfavourable* prognosis, on the other hand, or, if not strictly unfavourable, a very guarded opinion, should be given when this affection occurs after the cessation of the menstrual periods, or in aged females, or when it is caused by debauchery and intemperate indulgences, particularly in spirituous liquors. If symptoms of organic lesion of the viscera attend it; if the epigastrium and hypochondria be tumid, tender, and constantly painful, with heat of the palms of the hands and soles of the feet; if the respiratory function be impeded, or the circulation through the heart be irregular or obstructed; if the energies of life be depressed; if chronic disease have preceded the discoloration of the surface; if the colour deepen, be of long standing, and particularly if it be of a dark green hue; if it take place from the continued operation of the same cause, as grief, anxiety, and the depressing emotions; if the urine be small in quantity, white, or albuminous, or very dark, turbid, thick, or blackish; if there be indications of supervening dropsy; if a colliquative form of diarrhœa supervene, or very dark, grumous, or pitchy evacuations, or vomitings of a nearly similar matter; if the affection be of long duration, and particularly if it be associated with dropsical effusions; if hiccough, with tumefaction of the epigastrium and hypochondrium, or a tympanitic state of the abdomen be present; if delirium, delirium tremens, mania, epilepsy, lethargy, coma, paralysis, convulsions, or apoplexy occur; if intestinal hæmorrhage or hæmatemesis take place; if the jaundice proceed from calculi in aged persons, or appear after repeated attacks of ague or remittent fevers, and from continued melancholia; if it be accompanied with great depression of the mental and physical powers; if marked cachexia and great emaciation be present, and especially if it be complicated with internal or external malignant disease, a very unfavourable prognosis should be given.

63. XIII. Remote and Proximate Causes.—The chief causes have been stated in what has been advanced respecting the pathological re-

lations of jaundice.—*a.* It is obvious that the more *remote* causes are those which induce the alterations, of which the discoloration is a symptom. These are fully detailed above (§ 15), and in the articles CONCRETIONS—BILIARY; DUODENUM; GALL-BLADDER AND DUCTS; and LIVER—*Diseases of*. Those which most frequently induce this complaint are, habitual excitement of the liver, duodenum, and digestive organs generally, by too rich, too stimulating, or too much food, or by spirituous or intoxicating beverages; sudden and violent mental emotions; anxiety, or the depressing passions; high ranges of temperature, indolence, and full living; vicissitudes of temperature; the ingestion of cold fluids when the body is perspiring; miasmata or exhalations from the soil, especially in connexion with humidity of the air; suppressed discharges and accustomed evacuations; interrupted circulation through the heart, occasioning congestion in the vena cava and hepatic vein; previous disease, particularly periodic fevers, &c.; whatever depresses the energies of life, and at the same time favours internal visceral obstruction; and the organic changes already noticed.—*b.* The *proximate* cause of jaundice may be stated to be the passage of the colouring or other principles of bile into the circulation, and the consequent discoloration of the skin and other tissues, heightened in some of the varieties by the accumulation in the blood of the elements of which bile is formed.

64. XIV. TREATMENT.—There are few diseases which require so much discrimination, as to the *indications* and *means of cure*, as jaundice. It proceeds in different cases, as shown above, from so many different pathological states, and sometimes from so many combinations of them, that the utmost attention and practical acumen are necessary to ascertain the morbid conditions and peculiarities of the case, and to determine what is most efficacious in removing them. It is requisite not merely to guard against vascular excitement on the one hand, and vital depression on the other; but in many cases, also, to prevent or to remove both, as being the more immediate causes of the obstructed secretion or excretion of bile. In all cases the states of general and local organic nervous power, as well as of general and local vascular fulness or action, must claim particular attention; and, in many, it will be found requisite to aid the former while we diminish the latter. In any circumstances, it is very difficult to ascertain what are the effects of remedies upon the circulation and functions of the liver; for much of what has hitherto been said and written upon the subject has been characterized by dogmatism rather than by truth—by vague assertion, unsupported by evidence. Some of the medicines which have been supposed to excite the liver probably operate by removing slight obstructions from the mouth of the common duct, by reducing vascular turgescence in the duodenum, and carrying off mucous collections; and others which have been viewed as inert, as respects this organ, have as great influence upon its functions, as those whose effects have been considered specific. The operation of medicines in affections of the liver so much depends on the state of vital activity and of vascular action, on the extent to which biliary collections may have formed, and on the facilities to its excretion, that facts are rarely observed with that degree of precision in all these relations which should entitle them to confidence, or to be made data for practical inferences.

65. i. *Jaundice from an exuberant Secretion of Bile*, there being no evidence of its obstruction, is not so frequent in this as in miasmatous and warm climates. In these especially, the treatment must have due reference to the remote causes, and to the more immediate source of the biliary exuberance. In temperate climates, and in European constitutions, this state of the biliary function is connected with biliary remittent fever, and is most appropriately treated by the means most serviceable for the constitutional affection; but it sometimes continues, or returns after the fever has disappeared. In these cases, as well as in those where it presents a more idiopathic character, there is every reason to infer the presence of active circulation in, or vascular determination to the liver, probably with increased activity of the absorbent function. For them, moderate *local depletion* from the margins of the ribs, or from below the shoulder-blades; *cooling diaphoretics*, especially the nitrate of potash, the solution of acetate of ammonia, or subcarbonate of soda, and spirits of nitric æther in camphor mixture; *emollients* and *demulcents*; soothing enemata and *diluents*, are the most efficacious means, particularly when the causes no longer exist, or when the patient is removed from the influence of miasmatous exhalations, or enjoys a dry and pure air. The *diet* in these cases should be very spare, and consist of mucilaginous and farinaceous substances; animal food should be taken sparingly and cautiously during convalescence, and stimulating beverages entirely relinquished.

66. ii. *Jaundice from Inflammation of the Substance of the Liver* is more frequent than is generally supposed. It is often merely an exalted state of the former variety, the vascular disorder having advanced to such a pitch as to obstruct the secretion or excretion of the bile, owing to the general turgescence of the vessels, and consequent pressure on the minuter bile ducts; and it is most frequently observed when the internal structure of the organ is generally inflamed, or is the seat of one or of several abscesses. (See LIVER—*Inflammation of*.) When the attack is *slight*, and is attended by little pain, or by pain increasing slowly after pressure; and when there is little fever, the pulse being oppressed rather than much accelerated, *local depletions* from the margins of the ribs, and from the anus, with the other means just advised (§ 65), will generally remove all disorder. But when the bowels are costive, additional means will be required, especially *mercurials* with antimony; *saline medicines*, either alone or with other *aperients*; a solution of sulphate of magnesia in camphor julep, with the solution of the acetate of ammonia, and spirits of nitric æther; the warm turpentine epithem applied over the epigastrium; the warm bath, &c.

67. In the more *acute cases*, particularly when there are much fever, intensely deep jaundice, very quick pulse, dry tongue, flushed countenance, and scanty, dark urine, the treatment

should be most actively antiphlogistic. General *blood-letting* ought to be early employed, and be followed by local depletion; by full doses of *calomel*, or of calomel with JAMES'S *powder*, camphor and opium; by *saline aperients*; by *antimonials* and saline *diaphoretics*; and by the rest of the means advised in the article on *Inflammation* and *Abscess* of this organ. In all such cases, the treatment should vary according to the history of the case, particularly in respect of previous disease of this viscus, and to the habits, age, and other circumstances of the patient. If the treatment be not active at the commencement, and in some instances where t has been both active and judicious, delirium and coma will supervene in four or five days, or even earlier, if vital power be exhausted, and if the discoloration be very deep. In this stage, treatment will seldom be of much avail. The propriety of then having recourse to depletion will entirely depend on the strength and frequency of the pulse, on the state of the hepatic regions, and on the means previously employed. In some, local depletions may still be resorted to; but, in all such, camphor with other mild restoratives will be appropriate. Calomel will seldom be of any use at this period if it have been already liberally prescribed. If it have not been employed, it may be given with camphor. Some benefit may accrue from an occasional exhibition of a draught containing spirit of turpentine, with or without castor oil; from the same substances administered in enemata; from the warm turpentine epithem applied over the epigastrium and hypochondria, and from a large blister on the nape. When jaundice is dependant upon abscess of the liver, the treatment must be conducted as advised for this state of disease in the article LIVER.

68. iii. *Jaundice from Congestion of the Portal and Hepatic Veins* often requires very nearly the same treatment as just recommended for the slighter states of the preceding variety (§ 66). *Local blood-letting* is generally sufficient; and unless in cases where the congestion depends upon dilatation of the cavities of the heart, the application of leeches to the anus is preferable to cupping over the hypochondria. If the congestion is connected with a stoppage of the hæmorrhoidal flux, leeches are especially serviceable. When congestion is chiefly in the hepatic veins, the circulation through the heart and lungs is often interrupted, and the congestion soon extends to the portal system, to the mesenteric veins, and the digestive mucous surface; the early stage of jaundice being characterized by a bloated appearance of the face, sometimes with lividity of the lips, and a deficiency merely of the bile in the stools. In these cases, the treatment should be chiefly directed to the primary complaint, and be modified according to the evidence furnished of the cause of obstruction. (See HEART—*Organic Lesions of.*) When *hæmorrhage* from the digestive or respiratory mucous surface occurs in this variety, as sometimes observed, *cupping* from the sternum, or leeches applied to the anus, will be of service. In many cases of this kind, the liver is more or less enlarged, owing to the prolonged congestion; and although there can be but little expectation of a permanent restoration of this organ to its functions while the obstruction to the circulation continues, deobstruent and saline *purgatives* will generally be useful, especially mercurials, the bitartrate of potash with the sub-borate of soda and confection of senna, the preparations of taraxacum with soda, and the hot turpentine epithem placed on the abdomen, &c. *Dropsical effusion* sometimes takes place in the advanced course of this form of jaundice, and requires *diuretics*, in addition to the decided exhibition of the medicines just named. The internal and external use of the spirits of turpentine; the compound decoction of broom with the acetate of potash, or with carbonate of soda, and spirits of nitric æther; weak solutions of the hydriodate of potash, or the solution of potash; occasionally the more drastic or hydrogogue *purgatives*; and a course of deobstruent *mineral waters*, such as those of the Beulah Spa, of Cheltenham, Pullna, Seidschutz, [Saratoga, Avon, Sharon, and the Virginia Sulphur waters,] &c., will sometimes be of service.

69. iv. *Jaundice from Chronic Organic Lesions of the Liver* requires a treatment modified according to the history of the case, and the signs furnished by a careful examination of the hypochondria, and even of the lower regions of the thorax. If the patient have had attacks of acute or subacute hepatitis or dysentery, or is subject to chronic dysentery or diarrhœa, very probably the circulation through the extreme branches of the portal vein, and the passage of bile along the small ducts, are obstructed by a deposite of albuminous lymph from the inflamed vessels in the areolæ or reticulations of the connecting cellular tissue of the organ, and by the pressure on these vessels thereby occasioned. In cases of this kind, more or less enlargement of the liver may be detected, especially in those which are less chronic; although, in the more protracted, the liver may have regained its former size, or have become even smaller, its structure being dense, granulated, or otherwise changed. In these latter, the nutrition of the organ, as well as its functions, is impaired, and the deposites formed in the substance of the organ become organized, or partially identified with it, and perpetuate the obstruction. In this variety, particularly in the less prolonged instances of it, the *exciting causes* of the hepatic disorder should be avoided. *Diet* and *regimen* will very much assist the treatment. Stimulating food and drink should be relinquished, and *deobstruents* and *alteratives* adopted. If any remains of inflammatory action still exist, *leeches* should be applied to the anus, or to the epigastrium. In any circumstances, PLUMMER'S *pill* should be taken regularly at bedtime, either alone, or with a little *soap* and extract of *taraxacum* (F. 503, 511), and the *bitartrate of potash*, with the *sub-borate of soda*, in any vehicle, or with other medicines, according to the state of the bowels (F. 89, 96, 98).

70. If *evacuations of blood* from the bowels occur, the *hydrargyrum cum creta* with *ipecacuanha*, enemata containing *spirit of turpentine*, or an occasional draught with this substance and castor oil, or the *nitric* or *nitro-muriatic acids*, in the simple infusion of roses, will be useful. In all cases, frequent *frictions* over the hypochondria and epigastrium with an oleaginous and deobstruent *liniment* (F. 297, 311), or with

this conjoined with the mercurial liniment, will be of essential benefit. This variety, like the preceding, is very apt to become complicated with *anasarca* or *ascites*, or with both. In this case, the decided use of *mercurials*, the more drastic and hydrogogue *purgatives*, the bitartrate of potash in large doses, with borax, *diuretics*, and the other means noticed above, and advised for DROPSY proceeding from disease of the liver, will be requisite. Assiduous frictions of the hypochondria and abdomen with *liniments*, particularly with these just mentioned, or with those containing the *iodide of potassium*, and a course of deobstruent and purgative *mineral waters* (§ 68), will sometimes be of use.

71. v. *The more doubtful Source of Jaundice in Spasm of the Ducts*, requires means which have a stricter reference to the remote causes, and to the symptoms peculiar to the case, than to the existence of spasm. A large proportion of the cases usually attributed to this state most probably would have been found, upon a more accurate investigation, to belong either to congestion of the hepatic veins, or to calculi lodged in the ducts, or to obstruction of the mouth of the common duct, arising from the state of the duodenum; and they consequently would have required a similar treatment to these. The affection attributed to the ducts may have been almost entirely confined to the duodenum; the means found of service, as *calomel*, alone or with *opium*, saline or other *purgatives*, *anodynes*, *emetics*, &c., instead of acting upon the former, actually removing the disorder of the latter, or carrying off mucous sordes from its surface, or subduing vascular turgescence from around the opening of the common duct. When there is any reason to suppose that the reputed spasm of the ducts is actually a paralyzed state of the organic nervous influence of the liver and ducts, *restorative means* will then be required. The *chlorate of potash* with carbonate of soda, gum *ammoniacum* with Castile soap, the nitric or *nitro-muriatic acids* given internally, or the nitro-muriatic acid lotion or bath, *frictions* with stimulating liniments on the hypochondria, the ammoniacal and mercurial *plaster* in this situation, and *blisters*, will be severally beneficial in cases of this kind, as well as in the immediately preceding variety, when the energies of life are much exhausted.

72. vi. *Jaundice from Obstruction of the Ducts* (§ 35).—When the obstruction depends upon the *passage of calculi*, as evinced by the symptoms noticed above (§ 39), and more fully described in the article CONCRETIONS—BILIARY (§ 6), the means fully detailed in that article (§ 14) should be resorted to, especially full doses of *opium*, alone or with antimony, of *belladonna*, or of other narcotics; the *warm bath*, warm *fomentations*, or the *turpentine epithem* on the abdomen, &c. No advantage, but rather mischief, results from the exhibition of mercurials in this state of the disease. When the obstruction arises from *compression, inflammation, and obliteration of the ducts* (§ 38), in some part of their course, or even near their entrance into the duodenum, as from malignant tubera or other organic changes in the liver, or in the vicinity of the capsule of GLISSON, and from the organic lesions of the duodenum and pancreas already noticed, Dr. BRIGHT considers that the evacuation of fatty matter in the stools is not infrequent, especially if the biliary obstruction is permanent. In these cases, jaundice assumes a dirty or dark green hue, and is but little benefited by treatment; emaciation, exhaustion, hæmorrhage from mucous surfaces, or coma, supervening, and terminating existence. Palliative means, however, should be employed, especially *opiates*, the *solution of potash*, or of the *iodide of potassium*, with extract of *conium* or *hyoscyamus*. The constitutional powers should be supported by mild tonics and gentle nourishment, and irritation of the stomach allayed by opiates and salines given in aromatic vehicles, or by other appropriate remedies.

73. vii. *The other States and Associations of Jaundice* require the same principles and means of cure as have been stated, according to the peculiarities of individual cases.—*a*. This especially obtains in respect of *green or black jaundice*, the most appropriate means for which have been just noticed (§ 46); and in regard of *the complications and successions of jaundice* (§ 49), which usually present one or other of the pathological states already considered, particularly under the first, second, and third varieties.

74. *b*. For *cachectic* or *pseudo-jaundice* (§ 45), the remedies mentioned in the articles CACHEXY, CHLOROSIS, CANCER, FUNGOID DISEASE, &c., may be resorted to, when these or any other malignant malady resembles jaundice, owing to contamination of the circulating fluids, or is associated with it. In such cases of contamination, as well as in the very acute and febrile form of jaundice, denominated *malignant* or *pernicious* (§ 58), the alkaline carbonates with camphor, solutions of the chlorate of potash, or of chlorinated soda, and the other means advised for the hepatic complications of *Typhoid* and *Putro-adynamic* FEVERS (§ 49), will be most appropriate.

75. *c*. *Traumatic jaundice* (§ 52) must be treated according to the symptoms evincing the existence of any of the pathological states and alterations above referred to (§ 26), and conformably with the principles already stated.

76. *d*. *Infantile jaundice* (§ 53) requires merely gentle aperients, especially the *hydrargyrum cum creta*, with dried *subcarbonate of soda* and *rhubarb*, with an occasional dose of *castor oil*.

[The treatment of infantile jaundice is not as simple as might be inferred from the summary manner in which the subject is dismissed by our author; for, as in adults, it must vary according to the nature of the cause. Gentle laxatives, as *castor oil*, will often be all that is required where it arises from simple retention of the meconium; but it will sometimes continue, and make it necessary to change the nurse, or render the milk slightly purgative, by the use, on her part, of mild saline cathartics. *Manna* dissolved in whey or milk is extremely well adapted to infants labouring under this affection; and in all cases, great attention must be paid to the diet and regimen of the nurse. We have known this disease suddenly invade the child from the effects of grief, anxiety, or a fit of passion on the part of the mother or nurse; hence the importance of great equanimity of mind while nursing. It is also excited by crude and acescent articles of food, which, with all spirituous potations, must be in like manner prohibited.

We shall generally find in these cases of jaundice in infants great acidity of the primæ viæ; hence the benefit that arises from the use of alkalies, which soothe the irritated mucous membrane of the stomach and bowels; of these, none is better adapted to meet these indications than the *sesqui-carbonate of potash*, which may be given three or four times daily, in two grain doses, in sirup or mucilage.

Infantile jaundice is, however, sometimes connected with an inflamed state of the gastro-duodenal mucous membrane, involving the orifices of the bile ducts, and which is the sequel of ordinary functional disorder. This pathological condition is generally attended with more or less sickness, with vomiting of thin mucus, mixed with the undigested milk, and tenderness on pressure over the epigastric region. The treatment, under these circumstances, may need, in addition to that above recommended, a leech or two, followed by a poultice or a small blister over the part affected, and this will prove especially necessary where the inflammation has extended to the liver; and in addition, very minute doses of calomel, with the warm bath, and fomentations or a small quantity of ipecacuanha, may be combined with the calomel, and these should be administered with occasional doses of oil, until the alvine evacuations exhibit a healthy reaction of bile. Where the irritability of the stomach is very great, forbidding the use of calomel and ipecacuanha, it has been recommended to apply mercurial ointment to the skin, over the region of the liver, as preferable to its application by friction, or by means of a plaster.

Where there is simple torpor, attended with enlargement of the liver, with an absence of bile in the stools, emetics have been strongly recommended by some writers on diseases of children; but the employment of leeches, small doses of calomel, and the warm bath, have generally proved successful in our hands, in combating this pathological condition. Should the case be attended with violent colic pains, tension of the abdomen, and other evidences of spasm of the bile ducts, or of the small intestines, the warm bath, emollient fomentations, with antispasmodic enemata, consisting of a weak infusion of poppy heads, or asafœtida, will be among the most useful remedies. Friction over the abdomen with the hand will also prove useful in these cases; and anodynes may be given, provided proper measures be taken to preserve the bowels in a soluble state. We should bear in mind, moreover, that spasm of the bile ducts is often occasioned by the presence of acid in the duodenum, which must be corrected by the frequent exhibition of small doses of alkalies. We have found the *dandelion* (*Leontodon taraxacum*) a very efficacious remedy in these cases; as we have, also, a decoction of the *succory* (*Cichorium intybus*), a plant which formerly enjoyed high repute in the treatment of jaundice, but which has very unjustly, of late, fallen into disuse. These plants both appear to possess decidedly aperient and deobstruent, combined with tonic properties, while, at the same time, they cause no irritation to the gastric-intestinal mucous membrane. They both act, moreover, on the biliary and urinary secretions, thus relieving abdominal congestion, on which protracted jaundice so generally depends.

There are many popular remedies in use for jaundice in different parts of our country, and, indeed, the whole class of indigenous *deobstruents*, so called, have had more or less reputation at different times in the treatment of this affection. Some practitioners employ the *tincture of sanguinaria*, in doses of from ten to fifty drops, three times a day, while others depend chiefly on cathartic doses of the *mandrake root* (*podophyllum peltatum*), combined with cream of tartar and cloves, to prevent griping. A decoction of the *barberry* and *dandelion*, with *soot tea*, has considerable reputation among the common people, and especially an infusion of the former in old cider. Among the botanic class of practitioners, the following recipe is in vogue: ℞. *yellow root or golden seal*, ʒj.; *bitter root*, ʒij.; *white poplar bark*, ʒij.; *capsicum*, ʒj.; cover with boiling water, then add a pint of Holland gin; dose, from half a wine-glass to a wine-glassful, morning, noon, and night. Diet, vegetable; taking at the same time, freely, a decoction of *dandelion* and *barberry*.]

77. viii. *Of various Remedies recommended by Authors for Jaundice.—A. Antiphlogistics* are advised by numerous writers in the treatment of jaundice. Stoll supposed that these means are more necessary in this complaint during winter or spring than at any other season.—*a. General blood-letting* is directed by Hippocrates, De la Motte, and others. Zacutus Lusitanus also recommends it, but with the utmost caution. Dr. Bright very properly limits it to the more acute or inflammatory cases. I have attempted above (§ 66, 67) to point out the circumstances and varieties in which it, as well as *local depletion*, should be practised, and have mentioned the situations where this latter may preferably be employed.—*b. Emetics* are prescribed by Hippocrates, Cælius Aurelianus, Horstius, Lentin, Hoffmann, Bocklesby, Stoll, and Conradi. When diffused inflammation, or even congestion of the liver is present, or when gall-stones are passing the ducts, they may be attended by some risk; but when inflammatory symptoms and pain are absent, and when the liver is not apparently enlarged or congested, they may be productive of benefit.—*c. Laxatives* and *purgatives* are much safer than emetics, and more generally appropriate. Hippocrates, Galen, Forestus, Ruland, &c., placed great dependance upon them. Much, however, depends upon the selection of them, appropriately to existing pathological states. Schneider prefers the combination of *senna* with *guaiacum*; Otto, *aloes* with *soap*; Lentin and Horn, *rhubarb* with *bitartrate of potash*; and the majority of recent writers in this country, *calomel* or *blue pill*, alone or with other purgatives. I have found, after one or more doses of these last, that any of the former will be very serviceable, especially the bitartrate of potash in large doses, either with the sub-borate of soda (F. 790) or with the confection of senna, or with this and guaiacum, according to the pathological states inferred to exist. Other purgatives will, nevertheless, be often equally beneficial; but in the more inflammatory cases the more cooling should be selected; and when a torpid state of the liver, or deficiency of vital action in it, is inferred, then the warmer, more stimulating, or stomachic aperients should be prescribed, and be

aided by the other means advised for this state. —*d.* The *diet* should also be suited to the treatment; and where depletions and evacuations are required, it ought to be most spare, cooling, and chiefly mucilaginous, or consist of the mildest of the farinaceæ.

78. *B. Diaphoretics and sudorifics* are prescribed by Cælius Aurelianus, Riedlin, Stoll, Richter, &c.; and *antimonials* are the remedies belonging to this class which are preferred by modern writers. When conjoined with other remedies, they are of much service; as with nitrate of potash, and the spirits of nitric æther, in the more inflammatory states, and with anodynes and opiates in some other circumstances. The *warm bath*, the *vapour bath*, *fomentations*, and *warm poultices*, may also be noticed under this head, as being sometimes useful. A diaphoretic as well as a deobstruent effect is also produced by a combination of calomel with antimonials and opium, or of calomel, camphor, and opium, and is often of great benefit in the more inflammatory varieties, after general or local depletions.

79. *C. Deobstruents and alteratives* of various kinds are much insisted on by Lentin, Stoll, and most modern writers. Several of these, suitable to the more chronic cases of jaundice, are prescribed in the Appendix (F. 503, *et seq.*). —*a.* The deobstruent effects of *mercury* in this complaint are much confided in by Desault, Thomann, and most recent writers; but there is little agreement between them as to the preparation which should be preferred, or as to the extent to which it should be pushed. Gibbon and others prefer *calomel*, and give it until it produces salivation. In the more chronic cases especially, I prefer Plummer's *pill* with *soap* and *taraxacum*, occasionally aided by *mercurial liniments* or *plasters* applied to the hypochondria.—*b.* Simple or medicated *soaps* are much praised by some authors, and particularly by Boyle, Stoerck, Ranoe, and Quarin. They are often very useful, either alone or with taraxacum, mild mercurials, ox-gall,* asafœtida, or with ammoniacum, or even with narcotics. The *alkaline subcarbonates* and *solution of potash* are also serviceable in similar combinations, and, as well as the soaps, are safe medicines in all states of the disease.—*c. Taraxacum*, in decoction or extract, has been much used in jaundice, since it was praised by Ranoe and Quarin; but it should be given in large doses, or be aided by other medicines, as the alkalies, soap, neutral salts, &c.—I have given it with small doses of *colchicum*, and in other combinations. [A very useful formula consists in its combination with confection of senna, sesquicarbonate of soda, and water.] (F. 76, 77, 392.) —*d.* The *Solanum dulcamara* was recommended by Linnæus for jaundice, but it is rarely prescribed, although much used as an alterative in cutaneous eruptions depending upon, or connected with biliary disorder. It may be advantageously given in decoction with taraxacum and the alkaline subcarbonates, or with the other alteratives already noticed (F. 59), Plummer's pill being taken at night.—*e.* I am not aware that the preparations of *colchicum* have been recommended for this complaint by writers. I have, however, prescribed it in several cases with marked benefit, chiefly in conjunction with mild mercurials, or with soap, alkalies, &c., or with magnesia or neutral salts, according to circumstances. It should be given in small doses, be continued for a considerable time, and carefully watched. If there be much debility, or if it produce depression, it should be given with camphor, or the more tonic substances recommended for the complaint. It often increases the biliary secretion in the cases depending upon chronic inflammatory action, or enlargement of the liver, and promotes resolution of the former, and diminution of the latter morbid state.—*f.* I have also given the preparations of *sarsaparilla* with advantage in conjunction with the liquor potassæ.

80. *f.* The internal use of *nitric acid* was advised by Frank. It is likely to be useful in some of the more chronic states. The *nitro-muriatic acid* was praised by Scott, Annesley, and others. I have found it decidedly beneficial in some cases, but have, contrary to the usual mode, prescribed it internally as well as externally. It may be employed as a warm foot bath, or as a lotion, applied warm or tepid, over the hypochondria and epigastrium. It is most serviceable in torpid states of the liver, and in the more chronic cases. It should not be employed when inflammatory action is present.—*g.* The *chlorate of potash* or the *chlorinated soda* will be sometimes useful in the circumstances or conditions of the disease in which these acids are indicated. The chlorate of potash may be advantageously conjoined with the carbonate of soda, or with other substances.—*h.* The preparations of *iodine* are sometimes also of service in similar states of jaundice to those just alluded to, especially the *hydriodate* and the *iodides of mercury*. These may be given with *conium* or other narcotics, particularly where there is reason to infer the existence of chronic obstruction, or malignant disease of the liver, or of adjoining parts.—*i.* The *liquor potassæ* is also indicated in such cases and in similar combinations.

81. *D. Diuretic deobstruents* are sometimes prescribed, but chiefly as adjuncts to aperients. They are noticed by Hippocrates and Riedlin. The *acetate of potash* (F. 841) is the most useful of this class, but the *bitartrate* is equal to it as a diuretic, and even superior to it as a deobstruent in diseases of the liver, when given in large doses, so as to act upon the bowels, or when combined with the *sub-borate of soda* (F. 790). Several of the foregoing medicines will be aided in their operation by emollient and mucilaginous diluents, as directed by Gilbert and others.

82. *E. Frictions* of the hypochondria and upper regions of the abdomen with stimulating and *deobstruent liniments* have received much less attention than they deserve. Indeed, they have hardly been noticed. When acute inflammatory action is not present, they will be found of much service. Several of those contained in the *Appendix* (F. 297, 311, &c.) may be prescribed either alone or with *iodide of potassium*, or the *mercurial liniment*. Subsequently the

* [Dr. James Johnson states that he has, in some very bad cases of jaundice, administered inspissated ox-gall in doses of five grains, gradually increased to ten grains, three times a day, with the best effect. He explains the action of the remedy on the principle that the ox-bile is the best substitute that can be found for the human biliary secretion.—(Braithwaite's *Retrospect*, No. 3, p. 31.)]

ammoniacal and *mercurial plaster* may be kept applied to the side.

83. *F. Anodyne antispasmodics and narcotics* are directed by VOGLER, RICHTER, HUFELAND, VOGEL, BRANDIS, and CONRADI, chiefly on the supposition of jaundice being often a consequence of spasm; and ipecacuanha with opium is generally adopted by them. As this complaint often gradually disappears upon the cessation or removal of the remote cause which occasioned it, much of the benefit that seems to follow these substances probably depends upon this circumstance. When the disorder proceeds from the retention of a calculus in the ducts, they are probably useful in relaxing the parts, and thereby facilitating the excretion of it. *Opiates* in full doses are prescribed by WENDELSTATT, VOGLER, THOMANN, DE CHAVE, &c., and *belladonna* by GREDING. In the states just named, and when severe pain is present, the advantages derived from them are unquestionable, whether exhibited alone, or with calomel, or with alkaline subcarbonates, or with camphor and emollients.

84. *G.* Of *stimulating antispasmodics*, the *spirit of turpentine* is the most deserving of notice. It is recommended by HOLST, ODIER, and DURANDE. I have prescribed it with benefit in several varieties of the complaint, and in various modes, as already stated (§ 70). *Asafœtida* is mentioned by HERZ; both it and *ammoniacum* are sometimes of use in cases depending on torpid states of the liver, especially when conjoined with soap, alkalies, and other medicines already noticed (see Form. 503–510, 891, 894). An infusion of the flowers of *arnica* was also prescribed by PLENCIZ and STOLL.

85. *H. Vegetable tonics and bitters* are directed by RIVERIUS, conjoined with aperients, and are often of great service when thus exhibited, and when aided by the alkaline subcarbonates or neutral aperient salts. The *absinthium* is recommended by CELSUS, DE HAYDE, and SOLENANDER; and *cinchona* by CAMMERARIUS, FAHNER, and DE HAEN. This latter is prescribed with antimonials by CORNETTE; but it should be given with caution, as it is contra-indicated in the more inflammatory states of jaundice. I have had reason to believe it to have been even productive of the complaint when exhibited freely in periodic fevers, before morbid secretions had been fully evacuated. The milder tonics and simple bitters are preferable to it in most cases, especially when they are prescribed as advised by RIVERIUS, and when given during convalescence.

86. *I.* Of the *other means* advised by authors there are few requiring particular notice. The watery extract of *Chelidonium* and the extract of *Chicorium* were recommended by RIVERIUS, LANGE, DE SCHULLERN, and others; the *Anagallis* with salines, bitters, and the ammoniochloride of iron, by STOLL; the *Agrimonia* by HILL; and the *Gramen caninus* and the *Berberis vulgaris* (F. 225) by several writers. Inspissated *ox-gall*, in as large doses as the stomach could bear, was prescribed by STOLL. *Blisters* on the hepatic region were directed by BANG; and *electricity* by HALL and DARWIN. The *mineral springs of Cheltenham*, of *Bath*, or of the *Beulah Spa*; the artificial mineral waters of *Seidschutz* and *Pullna*, or of *Ems*, *Eger*, and *Pyrmont*, are severally beneficial, when taken appropriately to the pathological states of the complaint. *Travelling* and *change of air* were much praised in jaundice by CELSUS and CÆLIUS AURELIANUS, and in modern times by GREGORY and others. Regular *exercise* on foot and on horseback is always of benefit, unless in cases depending upon inflammatory action.

87. The *Diet* and *Regimen* should be suited to the forms of the disease. *Asses' milk* is advised by HIPPOCRATES. *Common whey* and *goats' whey* are the best beverages that can be used during the attack. The drinks also prescribed under the head *Potus*, in the *Appendix* (F. 588, *et seq.*), will generally be found useful. Upon the whole, the *diet* should be very nearly as advised in the article CONCRETIONS—BILIARY (§ 18).

[There is no disease the treatment of which is more likely to be empirical than jaundice, and it arises mainly from the difficulty of diagnosis. It is an easy matter to assume the existence of a certain pathological cause or condition, and then adapt our remedies to that supposed condition. It is very likely, however, to happen that we are mistaken as to the true state of things giving rise to the disease. For example, how are we to distinguish jaundice arising from inflammation of the common duct from that originating in spasm, or an accumulation of mucus, or mechanical pressure from the duodenum, or an inspissated condition of the bile itself! The passage of a gall-stone may generally be detected by the pain, spasm, and general febrile irritation which it occasions; but the other causes too frequently elude our closest scrutiny.

But here, as in most other cases, we derive much assistance from the state of the pulse and the general condition of the system; and where febrile excitement or a pyrexial state indicates inflammatory congestion, bleeding, and other antiphlogistic measures, will be appropriate; and it is particularly to be noticed that, where inflammatory action is not present in the liver or its appendages, the action of the heart and arteries in jaundice is below the natural standard both as to fulness and frequency, with the exception, perhaps, of that form which is characterized by spasm.

Dr. DEWEES recommends to treat every case of jaundice attended with increased pulse by blood-letting, carried to such an extent as to induce a tendency to syncope or nausea; this to be followed by local depletion, by leeches or cups, over the epigastric region, at the same time keeping the bowels open by *castor oil* and enemata. The patient should also be directed to drink freely of mucilaginous teas, as flaxseed, marsh-mallows, or gum Arabic. It is not unusual to see jaundice promptly relieved by the administration of two or three active purges, in which some preparation of mercury is an ingredient. "In all varieties," says Dr. WATSON (*On the Principles and Practice of Physic*, Philadelphia, 1845), "of what, from its intensity and rapid accession, I may call acute jaundice, purging is strongly indicated; and we sometimes succeed in rectifying the whole morbid condition by thus applying a sudden *wrench* (so to speak) to the biliary organs, by giving, for instance, half a scruple or a scruple of calomel, and, a few hours afterward, half an ounce of castor oil with half an ounce of spirit

of turpentine." (Page 751.) Where we have reason to suppose the existence of spasm, general bleeding, followed by full doses of opium, will often prove successful. To these the warm bath, or an opiate enema, is a most valuable auxiliary. Dr. HEBERDEN recommends that patients who are liable to these painful, spasmodic attacks should always carry grain pills of opium with them, and to take one or two as occasion may require, repeating them according to the necessities of the case. Where jaundice has been owing, in all probability, to inspissated bile, we have derived important benefit from the use of super-carbonate of soda or the bi-carbonate of potash, which possess the power of diluting this secretion in a most striking manner.

Decided relief also will often follow the use of large draughts of hot water, as are recommended by Dr. PROUT, containing, in solution, the carbonate of soda (ʒi. to ʒij. to Oj.). The alkali counteracts the distressing symptoms produced by the acidity of the stomach, while the hot water acts like a fomentation to the seat of the pain. "The first portions of water," he remarks, "are commonly rejected almost immediately; but others may be repeatedly taken, and, after some time, it will usually be found that the pain becomes less and the water is retained. Another advantage of this plan of treatment is, that the water abates the severity of the retching, which is usually most severe and dangerous where there is nothing present upon which the stomach can react. This plan does not supersede the use of opium, which may be given in any way deemed most desirable, and in some instances a few drops of laudanum may be advantageously conjoined with the alkaline solution after it has been once or twice rejected." In chronic jaundice we place much reliance on a decoction of the *succory* (*Cichorium intybus*) or the *dandelion* (*Leontodon taraxacum*), with soda. The diet should be mild and unirritating, the more simple the better; while the tepid bath should be daily employed, and as much exercise as possible taken short of fatigue.]

BIBLIOG. AND REFER.—*Hippocrates*, Περι των εντος παθων, p. 351, l. 29, 31; και p. 551, l. 24.—*Dioscorides*, l. ii., c. 59, 66.—*Plinius*, Hist. Nat., l. xxvi., c. 12; xxviii., c. 16; xxx., c. 11. — *Aretæus*, Chronic. l. i., c. 15. — *Galenus*, De Loc. Affect., l. v., c. 7. — *Avicenna*, Canon., l. iii., fen. 15, tract i., cap. 2. —*Alexander Trall.*, l. iii., c. 33. —*Forestus*, l. xix., obs. 15, 16, 22, 23. —*Augenius Horat.*, t. i., l. x., ep. i. — *H. A. Brd*, Catalogus Medicamentorum ad Ictterum et Hydropem. Lugd., 8vo, 1597.—*Ballonius*, Cons. iii., p. 114. —*Th. Bedford*, Treatise of the Sufficiency of English Medicines for the Cure of all Diseases, the Jaundice, Dropsy, &c. Lond., 8vo, 1615. — *Zacchias*, De Malo Hypochondriaco, l. ii. —*Bontius*, Medic. Indor., cap. 10. —*Amatus Lusitanus*, cent. i., cur. 39; cent. v., cur. 65; cent. vii., cur. 48. —*Thilenius*, Medicinische und Chirurgische Bemerkungen, p. 211. — *Zacutus Lusitanus*, Med. Pr. Hist., t. i., l. ii., n. 113; and Prax. Admir., l. iii., obs. 137. — *W. Sermon*, A Friend to the Sick, with a Discourse of the Dropsy, Jaundice, &c. London, 8vo, 1673.—*Riverius*, Observ., cent. ii., n. 9. — *Lister*, Novæ Exercitationes et Descriptiones Thermarum Angliæ. Lond., 1684. — *Bonet*, Sepulch., l. iii., s. xviii., obs. 11. —*J. D. Saltzmann*, De Morbo Regio, seu Ictero. Argent., 4to, 1710.—*Baglivi*, De Pr. Med., vol. i., c. 9. — *J. G. Bezold*, De Cholelitho. Argent., 8vo, 1725; in *Halleri*, Disput. ad Med. Pr., t. iii.—*J. B. Bianchi*, Historia Hepatis, sive Theoria et Praxis omnium Morborum Hepatis et Bilis, 2 vols., 4to. Genev., 1725. — *R. Blackmore*, Dissertations on the Dropsy, the Jaundice, &c. Lond., 8vo, 1727.—*A. Camerarius*, *W. Agricola*, Usus Corticis ad Ictterum extensus. Tubing., 4to, 1730; in *Halleri*, Disput. ad Med. Pract. pert., t. iii. — *Morgagni*, De Sed. et Caus. Morb., ep. xxxvii., art. 2, 3, 4, 6.—*C. Drummond*, De Ictero. Edin., 8vo, 1750; in *Smellie's* Coll., vol. i.—*A. Petermannus*, Scrutinium Icteri et Calculis, &c. Mentz, 8vo, 1750; in *Halleri*, Disp. Med. Pract., t. iii.—*Lentin*, Beyträge, b. iv., p. 384.—*Stoerck*, Ann. Med., b. i., p. 150.—*Home*, Medical Tracts, &c., p. 33. — *Huxham*, Opp. i., p. 158. — *Lieutaud*, Histor. Anatom. Medic., l. i., obs. 817, et 1012. — *J. Dale*, The Gout, the Parent of Jaundice, &c. Lond., 8vo, 1767; and in Philos. Transact., No. 211. — *J. Hill*, A Method of Curing the Jaundice and other Disorders of the Liver, by the Herb Agrimony. Lond., 8vo, 1768. —*Hoffmann*, De Cachexia Icterica, obs. 2, Opp. iii., p. 307. — *Brocklesby*, Œconom. and Med. Observations, p. 267. —*F. N. Marquet*, Traité de l'Hydropisie et de la Jaunisse. Paris, 8vo, 1770 —*Stoll*, Rat. Med., vol. i., p. 284, 286, 220, 294; vol. iii., p 289; et vol. iii., p. 355. — *Coe*, Treat. on Biliary Concretions, &c., 8vo. Lond., 1767.—*Meckel*, in Nouv. Mémoires de l'Académie de Berlin, 1770. — *Linnæus*, Dissert. Dulcamar. Upsal, 1771. —*G. F. H. Bruening*, Tractatus de Ictero Spasmodico Infantum Epidem. Vesel, 8vo, 1773. — *J. Maclurg*, Experiments upon the Human Bile, and Reflect. on Biliary Secretion, 8vo. Lond., 1772. — *Marcard*, Vom Pyrmonter Brunnen, b. ii. — *Lange*, De Remed. Brunsvic. Domest., p. 26, 319. —*A. De Haen*, Rat. Med., cent. iii., c. 6; et de Vermibus Intestinorum et Ictero (App. ad Prælect. in *Boerhaave*). Viennæ, 8vo, 1780.—*Kemme* and *Behm*, De Ictero. Hal., 8vo, 1780.—*Quarin*, Animadversiones, p. 242, 244, 245.—*Plenciz*, Act. et Observ., p. 106. — *Sims*, in Memoirs of the Med. Soc. London, vol. ii., No. 25.—*W. Corp*, An Essay on the Jaundice. Bath, 8vo, 1785.—*Baldinger*, Krankheiten einer Armee, p. 226.—*Clarion*, in Journal de Médecine continué, t. x., p. 288.—*F. L. Bang*, in Act. Reg. Soc. Med. Havn., vol. i., p. 105; et Selectu Diarii, 1782–1787, *passim*.—*Ranoé*, in Ibid., vol. iii., p. 380.—*Retz*, Des Maladies de la Peau, et de celles de l'Esprit, qui procèdent des Affections du Foie. Paris, 12mo, 1790.—*J. Andree*, On Bilious Diseases and some particular Affections of the Liver and the Gall-bladder. Lond., 8vo, 1788.—*J. B. Baumes*, Mémoire sur l'Ictère. Paris, 8vo, 1788; et Traité de l'Ictère ou Jaunisse des Enfans. Paris, 8vo, 1805.—*Soemmerring*, De Morbis Vasorum Absorbentium, p. 117. —*Richter*, Medic. und Chir. Bemerkungen, p. 55, et 58.—*J. P. Vogler*, Von der Gelbsucht und ihrer Heilart. Wezlar, 8vo, 1791. *Greding*, De Belladonnæ Viribus in Icteri Curatione; in Advers. Med. Pract., vol. ii., part ii., No. 5.—*Saunders*, On the Structure and Dis. of the Liver, &c., 8vo. Lond., 1807. — *Darwin*, Zoonomia, vol. ii., &c. — *Hall*, in Transactions of Philadelphia, vol. i., p. i. — *Gibbons*, in *Duncan's* Annals of Medicine, vol. i., No. 1; and Medical Cases and Remarks (part i.—On Salivation in Jaundice). Sudbury, 8vo, 1799. — *Gibson*, On Bilious Diseases and Indigestion, with the Effects of Quassy and Natron in these Disorders. Lond., 8vo, 1799.—*John*, in *Stark's* Archiv., b. ii., st. ii., p. 131.—*P. A. Manoury*, Essai sur la Jaunisse. Paris, 8vo, 1802. — *Thomann*, Annales Wurceburg, p. 196.—*L. Caillot*, Notice sur la Fièvre Jaune, et la Jaunisse. Bresl., 12mo, 1804.—*Oechy*, in Beyträgen für die Zergliederungskunst, band ii., heft i., p. 63.—*N. Deyeux*, Considérations Chimiques, &c., sur le Sang des Ictériques. Paris, 4to, 1804.—*Frank*, Acta Institut. Clin. Vilnensis, ann. i., p. 108; et ann. ii., p. 75; et ann. iii., p. 90.—*Duncan*, in Medical and Surgical Journal, vol. iv. (*Hydatid.*)—*Portal*, Cours d'Anatomie Medic., t. iv., p. 34.—*Odier*, Manuel de Médecine Pratique, p. 233. —*Cornac*, Essai sur la Jaunisse, ou Ictére, &c. Paris, 1809. —*Horn*, Archiv. für Pract. Medicin., b. i., p. 284, 290; b. iii., p. 134; et b. vi., p. 341.—*Schneider*, in *Horn's* N. Archiv., b. ii., p. 24.—*M. J. B. Orfila*, Nouvelles Recherches sur l'Urine des Ictériques. Paris, 4to, 1811.—*Devilliers*, in Journal Général de Médecine, par *Sédillot*, p. 286, 1812.—*Winkel*, in *Hufeland's* Journ. der Pr. Heilk., b. viii., st. 3, p. 59.—*Holst*, in Ibid., b. xx., st. 2, p. 147.—*Hufeland* und *Himly*, Journal der Pr. Heilk., b. i., st. 3, p. 136.—*Mende*, in Ibid., August, 1810, p. 79, 105, 117. — *Herz*, in *Hufeland's* Journal der Pract. Arzneyk., b. iii., p. 595.—*Conradi*, in Ibid., b. vi., p. 483.—*Hufeland's* Journ. der Pr. Arz., b. ix., st. 2, p. 181.—*M. Baillie*, Observations on Green Jaundice, in Transact. of the College of Physicians, vol. v., p. 143.—*J. R. Farre*, The Morbid Anatomy of the Liver, &c., 4to, fasc. i. Lond., 1812. — *A. Portal*, Observations sur la Nature et le Traitement des Maladies du Foie. Paris, 8vo, 1813.—*Louyer Villermay*, in Mémoires de la Société Médicale d'Emulation, ann. v., p. 320.—*J. P. Frank*, De Curandis Hom. Morbis, lib. vi., De Retentionibus, pars iii., p. 296. —*J. F. H. Mahlendorff*, De Ictero. Berol., 12mo, 1818. — *Villeneuve*, Dict. des Sc. Méd., t. xxiii., p. 386; et *Gardien*, in Ibid., t. xxviii., p. 463. Paris, 1818. —*T. Mills*, An Inquiry into the Effects produced in the Brain, Lungs, and other Viscera, and on the Nervous System, by Diseases of the Liver. Lond., 8vo, 1819.—*Cheyne*, in Dub. Hosp. Rep., vol. i., p. 273. — *Marsh*, in Ibid., vol. iii., p. 265. — *Ferrus*, Dict. de Méd., t. xii. Paris, 1825.—*Weidemeyer*, in Journ. des Progrès des Sc. Méd., t. v., p. 257.—*Leuret*, in Ibid., t. viii., p. 256.—*G. Burnett*, in Medical Gazette, vol. v., p. 631. —*Corbin*, in Journ. Complément., t. xxxvii., p. 209.—*Roche*, Dict. de Méd. Prat., t. x. Paris, 1833. — *Burder*, Cyc. of Pract. Med., vol. iii. Lond., 1834.—*A. T. Thomson*, in Lancet, No. 592, p. 509; and *Gardner*, in Ibid., No. 663, p. 41. —*M. Chomel*, in Encyclographie des Sciences Médicales, Juin, 1835, p. 167; et *H. C. Lombard*, in Ibid. Janvier,

1837, B., p. 10.—*Alison*, in Edinb. Med. and Surg. Journ., No. 125, p. 287.—*Johnson's* Medico-Chirurg. Rev., No. 47, p. 352. — *Bright*, in *Guy's* Hospital Reports, vol. i., p. 605 (*An able paper on the Pathology of Jaundice*).—*Evanson* and *Maunsell*, Practical Treatise on the Management and Diseases of Children, p. 191. (See, also, the *Bibliography and References* to the articles Concretions, Biliary; Gall-bladder and Ducts; and Liver—*Pathology of.*)

[Am. Bibliog. and Refer.—*W. P. Dewees*, A Practice of Physic, &c., 1 vol., 8vo. A Treatise on the Medical and Moral Management of Children, 1 vol., 8vo.—*N. Potter* and *S. Calhoun*, Am. Ed. of *Gregory's* Elements of the Theory and Practice of Physic, 2 vols., 8vo.—*Jacob Bigelow* and *D. W. Holmes*, Am. Ed. of *Marshall Hall's* Principles of the Theory and Practice of Medicine.—*J. M. Galt*, Practical Medicine illustrated by Cases of the most important Diseases. — *James Ewell*, The Medical Companion, or Family Physician, treating of the Diseases of the United States, 1 vol., 8vo.—*John Eberle*, A Treatise on the Theory and Practice of Medicine, 2 vols., 8vo. — *R. Dunglison*, The Principles and Practice of Medicine, 2 vols., 8vo.—*T. Stewardson*, Am. Ed. of *Elliotson's* Principles and Practice of Medicine, 1 vol., 8vo.—*W. W. Gerhard*, Am. Ed. of *Graves's* Clinical Lectures.—*D. Hosack*, The Theory and Practice of Medicine, and Am. Ed. of *Thomas's* Practice, 1 vol., 8vo.—*S. G. Morton*, Am. Ed. of *Mackintosh's* Principles and Practice of Physic, 1 vol., 8vo.—*Walter Channing*, Case of Jaundice, in Bost. Med. and Surg. Journ., vol. i., p. 627: a very obstinate and chronic case, cured by an active cathartic course of aloes, colocynth, calomel, comp. infus. of senna with Rochelle salts, and the use of nitro-muriatic acid externally and internally.—*N. Chapman*, Thoughts on the Pathology and Treatment of Icterus, or Jaundice, in Am. Journ. Med. Sci. Bost. Med. and Surg. Journ., vol. iv., p. 405; vol. iii., p. 542. — *J. Eberle*, in Western Med. Gaz. (details a case of duodonetis attended with the symptoms of jaundice, and cured by blisters, absolute diet, and demulcents, with Dover's powder in the evening. Dr. E. seems to think there is no obstruction of the common bile ducts in these cases; but we believe that wherever there is much congestion or inflammation of the duodenal mucous membrane in the neighbourhood of the orifices of these ducts, as there always is in duodonetis, there will be more or less mechanical obstruction).—*E. G. Davis*, On the Proximate Cause of Icterus, in Bost. Med. and Surg. Journ., vol. vi., p. 122. (Dr. D. refers jaundice to diminished secretion, instead of obstruction.)—*M. L. North*, Case of Black Jaundice, in Ibid., vol. xxviii., p. 279. — *William Ingalls*, Case of Malformation of the Liver (Gall-bladder and Biliary Ducts wanting); Ibid., vol. xxii., p. 138. (In this case an infant began to pine at the end of first week; skin became jaundiced; emaciation succeeded; dejections of a milk colour, appetite voracious, and stomach retained food; pulse full and hard; surface of a citron colour, and very sensitive to touch; died at the end of the ninth week. On dissection, no gall-bladder or ducts found. A few years since we had a very similar case.)—*S. W. Moore*, Case of Jaundice, in New-York Med. and Phys. Journ., vol. iv., p. 78.—*M. Paine*, Med. and Physiol. Commentaries, 2 vols., 8vo.—*W. Stokes* and *J. Bell*, Lectures on the Theory and Practice of Physic, 2 vols., 8vo.—*J. Thacher*, Am. Modern Practice, &c., 8vo.—*F. Condie*, A Practical Treatise on Diseases of Children.—*James Stewart*, Translation of *Billard*, On Diseases of Children, 2d ed., 8vo. A Practical Treatise on Diseases of Children, 2d ed., 8vo.]

ICHTHYOSIS. — Syn. Derived from ἰχθύς, gen. ὑος, a fish. *Albaras nigra*, Avicenna. *Impetigo excorticativa; Lepra Ichthyosis*, Sauvages. *Ichthyosis*, Willan. *Lepidosis Ichthyosis*, Young. *Lepidosis Ichthyosis*, Good. *Ichthyose*, Fr. *Fischschuppenaussatz, Germ. Ictiosi*, Ital. *Fish Skin, Fish Skin Disease.*

Classif.—6. *Class*, Diseases of the Excernent Function; 3. *Order*, Affecting the External Surface (*Good*). 2. *Order*, Scaly Diseases; 4. *Genus* (*Willan*). IV. Class, IV. Order (*Author*).

1. Defin.—*Morbid enlargement of the papillæ of the skin, and thickening of the lamellæ of the epidermis, either in parts, or over the general surface, presenting irregular compartments, and resembling, in many cases, the scales of fish.*

2. *Ichthyosis* is defined by Willan and Bateman to be a papillary, indurated, and horny condition of the skin, to a greater or less extent. It has been placed by them among squamous diseases, but more recent writers have justly contended that it does not belong to this order. It consists of a morbid enlargement and elongation of the papillæ, and a thickening of the epidermis. Horny peduncles are thus formed, which spread so as to acquire broad, irregular tops, and, undergoing partial exfoliation, sometimes resemble the scales of a fish.

3. This affection is *general* or *local*, and *hereditary* or *accidental*. When it is hereditary, it either is congenital, or it does not appear until some months after birth. The local form is most frequently accidental, the more general affection is commonly congenital or hereditary. The states of the complaint have been differently divided, and even described, by writers. The division and description of Dr. A. T. Thomson are altogether incorrect, inasmuch as he confounds, as M. Rayer has shown, a disease of the cutaneous follicles with this affection, and mixes up a description of both under the denomination of *Fortuitous Ichthyosis.*

4. I. Description.—i. *Hereditary Ichthyosis* is commonly general, affecting those places chiefly in which the skin is naturally thick and the epidermis rough, and being entirely wanting on the prepuce, eyelids, groins, axillæ, and on the palms of the hands and soles of the feet. When the disease is *congenital*, it is usually but little apparent; but the skin, instead of being soft and smooth, is sallow, dry, and shagreen-like. In the course of the first two months the cuticle becomes, particularly in places, rough, thick, and of a grayish or sallow hue. It may remain in this state for years, or even during life, without proceeding farther; but the alteration may increase until it is very remarkable. Ichthyosis sometimes does not appear until several months after birth. It is then often developed more rapidly, until the epidermis is divided into small, irregular compartments, resembling that covering the legs of fowls, or the scales of serpents, the "*Ichthyose nacrée serpentine*" of Alibert.

5. Hereditary ichthyosis is sometimes limited in extent, and is confined chiefly to the extremities. It is then still more remarkably developed, and assumes the appearance of a thick epidermic layer, or of the bark of certain trees. In these cases, as in the foregoing, the epidermis is composed of a number of small compartments of irregular shapes, which are not imbricated, are from two to three lines in diameter, but are often broad in proportion as they are thin. The morbid surface is generally grayish or sallow; sometimes of a brownish hue; but, in a few cases, it is shining or opalescent. It is so rough that it feels like shagreen, or like the surface of a file, when the hand is passed over it, "*Ichthyose nacrée cyprine*" of Alibert. In these states of the complaint, the epidermis is chiefly altered, and the scales, excepting the largest, which adhere strongly, may be removed without causing much uneasiness. But, however detached, they are soon reproduced.

6. ii. *Papillary Ichthyosis*, or that in which there is chiefly a *remarkable elongation of the papillæ* of the skin, is a very rare variety. The first case of this kind, which was minutely described, was that of a native of Suffolk, who exhibited himself, in 1710, under the name of the *porcupine man*. More recently a family of the name of Lambert, affected with this variety, were described by Geoffroy St. Hillaire and others. About 1830, I examined a very

remarkable case, which was seen by many of the medical men of the metropolis. In all these instances the complaint was confined to the males of a family. The brothers Lambert could trace it back through five generations, all of which were affected with it. The alteration of the skin appears to have been the same in all the cases, and identical with that which I examined. The *papillæ* were remarkably hypertrophied and elongated, over nearly the whole of the cutaneous surface, excepting the prepuce, axillæ, groins, eyelids, soles of the feet, and palms of the hands. Over the rest of the body the elongated papillæ presented the form of short spines closely pressed together. They were whitish or grayish when separated, but blackish or brown on their exposed surface, and so hard and elastic that they produced a noise when the hand was quickly passed over them. These productions have generally exuded a reddish-brown serum when divided close to their bases, and have soon been reproduced. They could not be removed without pain.

7. iii. *Accidental and Local Ichthyosis* is a very distinct form of the disease from the foregoing, and is generally produced by pressure. It sometimes occurs on the lower and anterior parts of the thighs of shoemakers; and in other parts, where pressure is made, in various employments. It thus resembles corns in its mode of production.

8. In *the several forms of ichthyosis*, the morbid cuticle is generally thrown off in summer, or at other seasons, but it is soon after reproduced. Rayer states that the skin, divested of its squamæ, shows no appearance of inflammation; and that its colour is natural, only the shallow furrows on the surface are more remarkable than usual. The cutaneous perspiration and follicular secretion are suppressed. The complaint is not attended by pruritus, or by any other morbid sensation; the general health is unaffected by it. When it is general, copious perspirations take place from the soles of the feet, palms of the hands, and other parts above stated to be free from it. The pulmonary exhalation and urine are probably increased in proportion to the diminution of the cutaneous exhalation. Rayer thinks that persons affected with ichthyosis are liable to be attacked with acute inflammation of the skin, which throws off the morbid cuticle; but the original complaint is soon afterward reproduced.

9. iv. *The Anatomical Changes* constituting ichthyosis have been described by Tilesius, Buniva, and Rayer. The small compartments into which the epidermic layer is divided do not overlap each other like the scales of fish; hence the term ichthyosis is inappropriate. These layers, according to Buniva, consist chiefly of gelatin, hardened by phosphate and carbonate of lime. M. Delvaux states that they contain also traces of iron and of silica. They present the same chemical constituents as the hair, nails, &c. The lines or furrows of the surface of the corion are more distinct, and the papillary eminences more decided in this complaint than in the natural state. Tilesius found the cutaneous follicles obstructed, and full of a thick substance in *the papillary variety* (§ 6); and in the *squamous varieties*, examined by Rayer, these follicles were but little apparent, or imperceptible. Dr. Martin observed the hair and hair-bulbs remarkably enlarged; and the corion is usually thicker, harder, and denser than natural. Ichthyosis appears to be unconnected with any internal disease.

10. II. Diagnosis.—This affection is improperly classed, by Willan and Bateman, with squamous diseases, for it is entirely independent of inflammatory action. True ichthyosis always commences in a few months after birth, if it have not already existed; for the local variety can hardly be considered as connected with it, otherwise than in external appearance, and in the absence of inflammation. In *lepra*, *psoriasis*, and *pityriasis* the formation of scales is constantly preceded by redness of the skin; *lichen* is attended by severe pruritus, and preceded by the eruption of papulæ; and the scaly condition of *chronic eczema* is quite distinct from local ichthyosis. Ichthyosis, on the contrary, is attended neither by heat nor by pruritus, and is perfectly free from every inflammatory symptom. The *horny* or *warty productions* on the skin—the former of which has been classed, by Willan and Bateman, with this complaint—are entirely different from it, not only as to the form of the morbid formation, but also as to the extent of surface affected, these productions being limited to one or more points of the cutaneous surface.*

11. The *ichthyosis of the face*, noticed by Dr. Bateman and Dr. A. T. Thomson, has been more correctly described by M. Rayer, who has shown it to consist of a *sebaceous deposite* from diseased follicles. I have met with one instance of this affection extending over, and on both sides of the nose. It is always associated with inflammatory action in its developed state. The following is the description of it by Rayer: "The part of the integument affected becomes, at first, unctuous or oily; the secretion of the sebaceous follicles then increases; the fluid thrown out upon the surface acquires additional consistency, and finally forms a kind of *squamous crust or layer*, of greater or smaller extent. Soft at first, and adhering but slightly, it by and by acquires hardness, and then cannot be removed without very considerable pain. The skin under this sebaceous deposite is of a vivid red; the orifices of the follicles appear dilated, and sometimes distended with concrete sebaceous matter."†

* [These singular productions, often resembling the horn of the sheep, and which Alibert has arranged with *Ichthyosis*, under the names of *Ichthyose Cornée*, *Epineuse*, *Onguleuse*, and *Arietine*, according as they were conical, and pointed, or curved in the shape of horns, &c., are not of very unfrequent occurrence. A case lately came under our observation in which a horny protuberance, of the size of the little finger, grew from the centre of the lower lip to the distance of two inches; it was removed by the knife, and did not return. In the Pathological Museum of Geneva College is a model in wax of a case that occurred in one of the Parisian hospitals, where a horn, very much resembling that of the sheep, grew from the forehead to a distance of several inches. Bateman states that there is one in the British Museum eleven inches in length and two and a half in circumference. Villeneuve has collected 71 cases, of which 26 were seated in the scalp, 5 on the nose, 2 on the cheek, 3 on the lower jaw, 4 on the chest, 4 on the back, 3 on the anus and the penis, 4 on the buttocks, 12 on the thigh, 2 on the knee, 2 on the ham, 1 on the leg, and 3 on the foot. For a plate representing one of these excrescences, see Gross's *Path. Anat.*, vol. ii., p. 369.]

† [In a very able article on Ichthyosis, in the 2d vol. of the *Am. Jour. Med. Sciences* (Aug., 1828), by Dr. J. W. Francis, we have the following interesting remarks on this disease. The reader is referred to this article as one of the best monographs on the subject in our language. "The

12. III. Causes.—M. Rayer considers general ichthyosis to be a not infrequent disease. He has seen upward of forty cases of it. It is known to be transmitted through several generations, and only to the male offspring. The whole of the male children of the same father and mother, who were themselves free from it, have been affected with ichthyosis. This was the case with two brothers, one of whom was in the Hospital "*De la Charité*," in 1827. This disease is very seldom produced accidentally long after birth. Neither climate, nor temperature, nor mode of life, exercises any influence in causing it. Some have ascribed it to moral affections of the mother during pregnancy; but this is extremely problematical. That it may be congenital without the parents having been affected by it is shown by a fact stated by Rayer. He was consulted respecting three little boys who had it congenitally. Both parents were quite healthy and well formed, and the mother had never experienced disquietude nor alarm during these three pregnancies. It is very rarely observed in females.

13. IV. Prognosis.—Hereditary or congenital ichthyosis frequently disappears for a time in consequence of acute inflammation of the skin; but a person affected with it can hardly be considered as likely to be permanently cured of it. Accidental and local ichthyosis, however, often yields to treatment.

14. V. Treatment.—i. *Hereditary ichthyosis* of considerable extent has rarely been permanently cured. M. Rayer states that he has not succeeded in a single case. Happily, this alteration of the skin is unattended by internal disorder, and is thus, comparatively, of little consequence. Emollient applications long continued, gentle frictions, mucilaginous and soothing fomentations, tepid baths frequently repeated, or alternated with the watery vapour, or the alkaline warm bath, have been severally employed in clearing the skin from the scales covering it, or in preparing it for the application of other remedies. Willan and Bateman prescribed, without benefit, various plasters, stimulating lotions, and other topical applications. Mr. Coulson resorted to a wash containing corrosive sublimate, in a boy who was under his care; and subsequently a liniment, consisting of half an ounce of the ointment of nitrate of mercury and an ounce of olive oil, which was applied twice in the day. The scales soon disappeared, but the brown colour of the skin still continued. Willan recommends tar and pitch for this complaint, and gave as much as half an ounce, or even an ounce, daily, for some months; and Bateman adopted the same treatment, with advantage both to the local affection and to the general health. Dr. Elliotson, for one of two brothers affected with ichthyosis, prescribed a warm bath every day, and desired the patient to anoint himself, on coming out of it, with oil; gentle friction of the surface with sweet oil being employed twice a day besides. *Pitch* was also given internally, and increased gradually until ten scruples were taken three times in the day. The patient was clothed in flannel; was advised never to wipe

---

learned and classical investigations of Dr. Good have led him to dispose of squamous affections under the genus *Lepidosis*, and to divide them into four species, the last of which is called by him the *L. ichthyasis*. Though the terminal *iasis* is by general consent applied to all the species appertaining to this genus of diseases, yet the word *ichthyosis* is preferred on this occasion as that which is most commonly used.

"The characteristic of this genus applies to those diseases which consist in an exfoliation of the cuticle in scales or crusts, and in some instances of almost a horny texture of the integuments: their outline is not regularly defined. Dr. Good considers them as owing to a morbid state or secretion of the rete mucosum or adipose layer of the part immediately beneath, which is sometimes too dry or deficient in quantity; sometimes, perhaps, absent altogether; sometimes, he adds, charged with a material that changes its natural colour; and sometimes loaded with an enormous abundance of a glutinous fluid, occasionally combined with calcareous earth. These lines of distinction are important to be kept in recollection in considering the pathological character of the elephantiasis of the Greeks, and for clinical purposes must not be overlooked.

"In the *ichthyosis*, or fish-skin disease, the cutaneous excretories seem to throw forth such an excess of earthy material that it sometimes encases the body, according to the language of Dr. Good, like a shell; and the cutis, rete mucosum, and the cuticle, being equally impregnated with it, the order of the tegumental laminæ is destroyed, and the whole forms a common mass of bony or horny corium, generally scaly or imbricate, according as the calcareous earth is deposited with a larger or smaller portion of gluten, in many instances of enormous thickness; sometimes giving rise to sprouts or branches of a very grotesque appearance, thus offering numerous varieties.

"The instances of the simple fish-skin disease are not so extremely rare; they may be seen in different climates, in individuals of different habits of body, and at different seasons; but cases such as those recorded by Machin, Baker, Ash, Martin, Home, and others may be cited as affording most singularly interesting pathological facts. It appears somewhat remarkable that Dr. Bateman, in noticing the characteristics of ichthyosis, should state that the disorder has only some tendency to scaliness, but without desquamation or the deciduous exfoliation. The Lepidosis ichthyosis is designated by Dr. Young as being marked with scales, harsh, dry, and almost horny. But the peculiarities of the fish-skin disease, according to different authors, are almost innumerable. Avicenna tells us the desquamation is accompanied with much itching; Dover, a slender authority, but one who had some practical opportunities, states it is bounded by a red margin; and in the Transactions of the Leipsic Society it is mentioned that the patient is not only invested with scales, in the manner of fish, but that he emits the exhalations of that animal. Æger non solum squamis piscium instar tectus erat, sed etiam, piscium odorem spargebat.

"The writer of these remarks has had various opportunities of witnessing several forms of those cutaneous disorders which have been arranged under the denomination of *fish-skin* diseases. Like the tumid affections of the lower extremity, they may be deemed of different kinds, and as deriving their origin frequently from different and even opposite causes. Hence the necessity of greater precision in the language employed in the description of them, and the inutility, if not impracticability, of grouping them together without full regard to specific differences. No one duly cautious would think of associating the case of puerperal sparganosis recorded by M. Chevalier, in the Transactions of the Medical and Chirurgical Society of London, with the swelled leg described by Dr. Hendy, though both may be pronounced enlargements of the inferior extremity. Clinical discrimination will consider the former as one of the morbid terminations of phlegmasia dolens, and the latter as a complaint mostly endemial to certain of the West India Islands, so much so as to have obtained its appellation therefrom, and as possessing peculiarities at variance with the characteristics of the ancient or true elephantiasis. Moreover, it becomes indispensable to an accurate knowledge of those disorders, that attention be paid to the divers sources of derangement of organic action, and consequent morbid structure. Details ought to be confined to concurring causes and essential symptoms, and the fact must not be overlooked that many of the most popular writers have incautiously adopted in their accounts the too fanciful and poetical description of Aretæus, and, in lieu of personal observation, contented themselves with being copiers of the copyists of that eloquent author; or, like Mead, Vogel, Falconer, Larrey, have incautiously confounded diseases of obviously different characters and natures.

"It is not a little singular that one of the most happy descriptions of the leprosy that has recently appeared is that by a gentleman unconnected with the medical profession, a Mr. Huggins, an indigo-planter in the district of Tirrhoot. His account relates to that species of the complaint which is prevalent in India. The reader will be struck with the circumstances which marked the disorder, as given by Mr H., and those published by Dr. Adams in his Morbid Poisons."]

the surface of his body after having anointed himself, and was directed to wear the same flannel shirt, drawers, and stockings, so that his skin was kept impregnated with oil. In about six or seven weeks the disease disappeared, the skin being soft and supple. The pitch produced no effect on the organs of digestion; and it neither was mixed with, nor had altered the smell of the evacuations. Dr. Elliotson refers to two instances of the disease having been cured by Dr. Willan by the use of pitch taken to the extent of an ounce daily. In Dr. Elliotson's case no benefit was derived from the warm bath, as it produced smarting of the surface after the removal of the thickened cuticle; but the use of the oil probably accelerated the cure. The arsenical solution has also been tried, but with either very little or no benefit.

15. ii. For *local or accidental ichthyosis*, flying blisters or topical stimulants have been directed. Gentle frictions with a flannel cloth after coming out of a simple or sulphureous tepid water bath, and the sulphureous fumigating baths, aided by active exercise, have been found most serviceable in this form of the complaint. Mr. Plumbe succeeded in two cases in removing this alteration of the skin, which was limited to the legs, by strapping the parts tightly with adhesive plaster, and applying a roller kept constantly moist with cold water. The straps were removed every fourth or fifth day. On the whole, this affection has been found to be very little under the control of medicine; and, notwithstanding the most active treatment has been adopted, the disorder has been known to continue for several years, with occasional variations.

[We have had but little experience in the treatment of this obstinate affection, but we are inclined to believe that a combination of iodine and arsenic or mercury, with sarsaparilla, and the warm bath, and frequent emollient fomentations, will prove the best remedies. The frequent use of the vapour bath, by exciting the cutaneous vessels, and mollifying the roughness of the skin, would doubtless materially increase the chances of cure. The purified *naphtha*, as lately recommended for the cure of pulmonary phthisis, would also be well worth a trial. We can hardly believe that the disease is an incurable one if proper means are employed; at any rate, no physician will be justified in acting on such a supposition in the present state of our knowledge.]

16. iii. The *affection of the sebaceous follicles* of the face, mistaken by Dr. A. T. Thomson for ichthyosis, was successfully treated by the decoction of the dock root, or the *Rumex obtusifolius*. It is prepared from one ounce of the sliced recent root, boiled in two pints of water down to one pint. The dose is a wine-glassful three times in the day. It may be taken alone or with the arsenical solution; if it should purge too briskly, a few drops of the tincture of opium may be added to each dose.

Bibliog. and Refer.—*Panaroli*, Iatralogismorum, seu Medicinalium Observationum Pentecostæ Quinque, &c. Romæ, 4to, 1652.—*Van der Wiel*, Obs. Rarior., cent. i. et ii, 8vo. Leidæ.—*M. Donati*, De Historia Medica Mirabili Opus, &c., lib. i. et iii., 4to. Mantuæ.—*Schenck*, Obs. Med. Rarior., p. 699.—*Turner*, On Diseases incident to the Skin, 5th edit., p. 30.—*Alibert*, Dermatoses, 8vo, Art. Ichthyose.—*Edwards*, Gleanings of Natural History, 4to, 3 vols., p. 212.—*Janin de Saint Just*, in Journ. Compl. des Sc. Méd., t. v., p. 220.—*Ansiaux*, Bulletin des Sc. Méd. de Férussac, t. xx., p. 269; Bulletin des Sciences par la Société Philomathique, No. 67, p. 146.—*Tilesius*, Ausführliche Beschreibung und Abbildung der Beyden Sogenanten Stachelschweinmenschen aus der Bekannten Englischen Familie Lambert, fol. Altenbourg, 1802.—*M. Buniva*, Particularités les plus Rémarquables de Deux Corn-écailleux, nommés Jean et Richard Lambert, observés à Turin en Février et Mars de l'an 1809, fig.; Mém. de l'Acad. Imp. de Sciences, Lettres, et Beaux Arts de Turin, 4to.—*Collet*, Sur l'Ichthyose Cornée, p. 280. Paris, 1815.—*Joulhia*, Sur l'Ichthyose Nacrée. Paris, 1819.—*Billard*, Traité des Maladies des Enfans Nouveaunes à la Mamelle, 8vo. Paris, 1823, p. 32.—*P. L. Martin*, in Medical and Chirurg. Transact., vol. ix., part i., p. 53.—*Willan*, On Cutaneous Diseases, 4to.—*Bateman*, On Cutaneous Diseases, 4to, 1829, p. 77.—*Elliotson*, in London Med. Gazette, vol. vii., p. 636.—*Coulson*, in Ibid., vol. x., p. 718.—*Plumbe*, On Diseases of the Skin, p. 334.—*Good*, Study of Medicine, vol. iv., p. 591.—*Steinhausen*, De Singulari Epidermidis Deformatione. Berlin; and Gazette Médicale, 1831, tom. ii., p. 10.—*A. T. Thomson*, in Cyclopæd. of Pract. Med., vol. ii., p. 586. Lond., 1832.—*Green*, On Diseases of the Skin. Lond., 8vo, 1835, p. 340.—*Rayer*, On Diseases of the Skin, &c., p. 967. Lond., 8vo, 1835.—*W. C. Dendy*, Practical Remarks on Diseases of the Skin, &c., p. 70. Lond., 8vo, 1837.

[Am. Bibliog. and Refer.—*John W. Francis*, in Am. Jour. Med. Sciences, vol. ii., p. 257. Am. Ed. of Cazenave on the Skin.—*N. Worcester*, A Synopsis of the Symptoms, Diagnosis, and Treatment of the more common and important Diseases of the Skin. Phil., 1845.]

ILEUS.—*See Colic.*

IMPETIGINOUS AFFECTIONS.—Syn. *Impetigo* (from *impeto*, I attack or infest), Celsus, Pliny. Λειχην αλφος, Galen. *Lepra Squamosa*, Auct. var. *Herpes*, *Phlyctæna*, *Lichen*, &c., Auct. *Phlysis Impetigo*, Young. *Ecpyesis Impetigo*, Good. *Dartre crouteuse*, Fr. *Zittermal*, *Ringwarm*, Germ. *Impetigine*, Ital. *Tetter*, *Humid or Running Tetter*.

Classif.—3. *Class*, 3. *Order* (*Cullen*). 6. *Class*, 3. *Order* (*Good*). 5. *Order*, Pustular Eruptions (*Willan*). III. Class, I. Order (*Author*).

1. Defin.—*An eruption of one or more crops of small, yellow, itching pustules, disseminated or collected in clusters, the contents of which dry up in a short time, and assume the form of yellowish, rough, or prominent incrustations; generally unaccompanied by fever, and not contagious.*

[This affection may be said to consist in a state of active inflammation of the cutis, on which minute *vesicles* are speedily formed, the contents of which are at first transparent, but which become shortly after *opaque*; when the skin is broken, and the fluid escapes, it dries on the part, and forms scabs or scales of a yellowish-brown hue, varying in thickness and adhesiveness according to the quantity of the fluid discharged. So that *impetigo*, in different cases and their stages, exhibits *vesicles*, *pustules*, and regularly formed *scales*, somewhat resembling those of *psoriasis*. *Scabies* and *eczema* are also characterized by vesicles and pustules.]

2. I. Description.—Impetigo may attack every part of the body. It may be simple or complicated. Willan, Bateman, and Bierr enumerate five species of the disease. I agree, however, with Dr. A. T. Thomson, in limiting them to two, three of those proposed by Willan being merely varieties of simple impetigo. The first species, or simple impetigo, according to this view, is unattended with fever, and comprises the figured, scattered, and scabid varieties. The second, or complicated, or erysipelatous species is attended with fever, owing, probably, to the extension of the inflammatory action to the more deeply-seated integumental tissues.

3. i. *Simple Impetigo—Impetigo simplex*—usually occurs without any premonitory symptoms or derangement of health. It is met with most frequently in children at the period of dentition, in young persons of either sex, and in those of a sanguineous and lymphatic temperament, with a fine, susceptible skin and florid complexion. It most commonly appears in the spring, at which season several have been periodically attacked by it during many successive years. This species occurs principally under two varieties. The pustules may be collected in circular or oval groups, occupying a surface of greater or less extent, but pretty exactly circumscribed; this variety constitutes the *Impetigo figurata* of WILLAN. Or the pustules may be scattered far apart, assuming no particular form, but disseminated over a surface of variable extent: this variety has been called *Impetigo sparsa*. To these a third division has been added, by the name of *Impetigo scabida*; but this is merely a more severe form of *impetigo sparsa*. Many intermediate degrees exist between these varieties; but the characters they present are sufficiently distinct to give scope to the general study of the disease. At the same time, each variety may be acute or chronic, according as it consists of a single crop, or of successive eruptions of pustules.

4. *A. Impetigo figurata—Dartre crustacée flavescente* of M. ALIBERT—is the most common of these affections. It may occur in any part of the body, on the neck, trunk, and extremities, particularly the hands; but it generally occupies the face, appearing most frequently on the middle of the cheeks, from whence it extends, in a circular or oval direction, over a considerable extent of surface. Sometimes it is confined to the eyelids, when it is commonly complicated with ophthalmia; and occasionally it appears on the chin, the ala nasi, and immediately below the margin of the septum of the nose. Although this variety usually occurs without very manifest disease of the general system, yet it not unfrequently follows anxiety or other depressing affections of the mind. In this case it is ushered in by a feeling of lassitude, by disorder of the digestive functions, by weakness and uneasiness, accompanied by pain in the epigastric region, and sometimes by cephalalgia. The eruption, as it first appears on the face, commences by one or more small, red, and very superficial blotches, which itch considerably, and gradually enlarge, becoming covered with small, yellowish, psydracious pustules, placed so close to each other as to be almost confluent, and surrounded by a red, inflamed border. The pustules are but slightly elevated, and are the seat and source of much heat and stinging pain. These clusters, which are usually of a circular or oval form, and of various dimensions, may continue isolated, or extend still farther by the development of fresh pustules at their circumference; and the eruption may be so extensive that both cheeks, and even the whole chin, may be covered with it at once. The pustules, however, do not remain long in this state; but in the course of thirty-six or forty-eight hours, or, at most, three days, they burst, and discharge an ichorous fluid, which dries quickly, and is converted into a yellowish crust of greater or less thickness, very friable, slightly furrowed, semi-transparent, and resembling portions of candied honey, or the concrete, gummy exudations on a cherry-tree. At the same time the discharge continues under these crusts, thereby increasing their thickness, and causing them to extend considerably beyond the limits of the original pustules; and it is usually at this stage of the disease that the patient is seen by the practitioner. The skin in the circumference of these incrustations is of a red colour; and if the scabs fall or are rubbed off, the integuments under them appear likewise red and excoriated, exhibiting, at the same time, minute pores, from which a purulent discharge exudes, which greatly augments the heat and smarting. Towards the edges of these diseased patches may be still seen some unbroken psydracious pustules, and others over which the liquid has flowed when it is scarcely coagulated. If the disease be of great extent, the features can hardly be recognised.

5. *Impetigo figurata* continues in its crustaceous state from two to four weeks, when it is not protracted by successive eruptions: the itching and heat then abate, as well as the morbid secretion; the incrustations become drier, and fall off irregularly, leaving one or more red spots or marks, which remain visible for more than a month. The cuticle, at the same time, is so thin as to be liable to excoriation from the slightest friction, and a very trifling exciting cause often brings back the disease. More frequently, however, the ichorous discharge is reproduced, accompanied with fresh crops of psydracious pustules; the eruption is frequently renewed after running its usual course, and thus continues for many months, sometimes for years. In this manner it becomes a chronic disease, although the successive inflammations keep it always in an active state. In these cases the inflammation does not spread superficially, but penetrates the whole thickness of the skin, and sometimes affects the subcutaneous cellular tissue. When the disease yields either spontaneously or to medical treatment, the amendment commences in the centre of the patches; and even when this occurs, not infrequently the edges retain their diseased character, and fresh pustules are produced; these, however, as the treatment proves successful, also gradually disappear, and the skin regains its natural colour slowly in these parts.

6. *Impetigo figurata* may appear on the limbs, and even on the body. When it affects the lower extremities, the patches are usually large, and of an irregular oval, whereas they are smaller and rounder on the upper limbs. Sometimes the patches enlarge by successive marginal crops: this has been observed on the legs, which have thus been gradually covered from above the knee to the ankle. The disease often becomes chronic, and the time of its duration varies. In such cases we do not observe successive and abundant crops of pustules, or these large inflamed patches, but merely a few occasionally. Frequently, however, no pustules are found; but the peculiar form of the patches and crusts, with the partial eruption from time to time, suffice to characterize it. In some instances the pustules are intermixed with transparent vesicles, as in some of the varieties of *herpes*. When this in-

termixture occurs, the disease is much more troublesome from the extreme irritation, itching, smarting, and heat which accompany it, and is much more difficult of cure. When these vesicles break, they discharge a fluid much more acrimonious than that of the pustules, which, wherever it touches the sound skin, produces a vesicular inflammation and a pustular eruption. This variety of the affection appears principally on the hand, about the metacarpal bones, or on the wrist. The vesicles appear in slow succession at a little distance from each other and from the pustules; when broken, they are little disposed to heal, and the cuticle ultimately becomes thickened and inflamed, and covered with the rising eruptions, small humid ulcers, and chaps or fissures. The sensation of burning and intense itching is extremely distressing, especially on the first rising of the vesicles; and every remedial application which is employed becomes a source of irritation, and increases the evil.

7. *B. Impetigo sparsa* differs from the preceding variety merely in the irregular and scattered distribution of the eruption. Its nature and progress are the same; but, instead of being arranged in circumscribed groups, its pustules are dispersed without any regular order over the extremities, neck, face, shoulders, and external ears. This variety is most prevlent in autumn, continuing obstinately throughout the winter, and disappearing only at the approach of summer. It has a greater tendency to pass into the chronic state than the last variety. Although it may develop itself on any part of the body, yet it affects more particularly the extremities, manifesting an especial predilection for the legs, and in that situation becoming extremely troublesome and obstinate. Sometimes it confines itself to one spot alone; at others it covers a whole limb, or even more than one, at the same time.

8. The pustules in *impetigo sparsa* are developed in the same manner as in *impetigo figurata*; but here, instead of being collected together, they are scattered irregularly over the diseased surface, and accompanied with insupportable itching. The incrustations, also, which follow the bursting of the pustules are thicker and more friable, and are not formed into so large plates as in *impetigo figurata*: the attendant inflammation is, however, more extensive; and as they fall off and disappear the surface of the limb becomes studded with ulcerations and fissures. Œdema is not an infrequent attendant or consequence of this variety of the disease.

9. In some cases, and especially in persons of advanced age, with enfeebled constitutions, the crusts attain a great thickness: they are of a yellowish brown colour, variously divided by deep fissures. They have been compared to the bark of a tree by Willan, who calls this variety *Impetigo scabida*. It is, however, nothing more than a severer form of the last variety. Sometimes these crusts cover a whole limb till it is cased with them, the motion of it becoming both difficult and painful; at the same time considerable heat and a tormenting itching exist. After a while these crusts split; and, when a portion of them is detached, a copious discharge exudes from the excoriated surface, quickly concretes, and fills up the vacuity. When this variety affects the lower extremities, and is very severe, it sometimes occasions œdematous infiltration and ulceration, and even extends to the toes and secreting matrices of the nails—*Onychia Impetiginodes*. The œdema and ulceration commonly appear about the ankles, particularly in aged, weakly, or broken-down constitutions. The ulcers are uneven, and either discharge a seropurulent fluid, or are covered by yellowish crusts, their edges being irregular, purplish, or livid, and often crowned with small sanguinolent pustules. When this variety occurs in the upper extremities it does not differ from that already described, but it is much less severe, and its chronic form more rarely associated with œdema and ulceration than that observed in the lower extremities. Acute *impetigo sparsa* of the face usually presents greenish yellow incrustations, dispersed over the cheeks, or adhering to the beard in the adult. In children the inflammation often extends to the nose, which swells, and is sometimes plugged up, the disease then frequently becoming chronic.

10. *C. Impetigo Favosa.* — This variety is merely impetigo sparsa affecting the *neck*, *ears*, and *hairy scalp*—the *Porrigo favosa* of Willan and *Tinea granulata* of Alibert—especially of children, and occasionally of adults. It occurs most frequently in the back parts of the head, but the entire scalp may be implicated; and it appears as yellowish white pustules, irregularly scattered over the hairy scalp, and attended by inflammation and pruritus, their centres being traversed by hairs. In from two to four days the pustules pour out a fluid, which agglutinates the hair, and dries into small brownish or grayish, rough, and irregular crusts or masses like candied sugar. These become friable and detached from the surface, but adhere to the hair, which often seems filled with them; a faint, sickly, or unpleasant smell being exhaled from the head when cleanliness is neglected. *Pediculi* multiply rapidly, and swarm in the hair, which is not lost, but is often agglutinated or matted by the discharge. Impetigo of the hairy scalp is not contagious, and does not implicate the piliferous bulbs, like *favus* or true *porrigo*. It seldom lasts longer than some months; and it commonly is removed in the course of a few weeks, with proper treatment. When it becomes chronic, the inflammation often extends to the cellular tissue underneath, giving rise to small, circumscribed abscesses. The lymphatic glands of the neck are frequently enlarged and painful. Rayer and Green consider that this affection of the scalp is strictly a form of *Impetigo sparsa*, and not a variety of the disease, to which Willan has applied the term *Porrigo*, and I am of the same opinion.

11. ii. *Complicated Impetigo.* — *A. Impetigo Eczematosa.*—Impetigo is sometimes associated with *Eczema—Eczema Impetiginodes*. (See art. Eczema, § 5.) The eruption so frequent in infants during suckling and teething, commonly called *Crusta Lactea*, or *Milk Scall*, is evidently an association of this kind, chiefly affecting the face, and extending partially to the scalp; the characters of eczema predominating in some infants, and those of impetigo in others. Occasionally it assumes nearly the appearance of impetigo figurata. It has been variously arranged by writers on diseases of

the skin, who have, even to the present day, been more desirous to point out, and even to feign distinctions, than to trace the changes which these diseases undergo and the connexions which subsist between them, or to show how frequently the one runs into the other; and has been termed *Impetigo larvalis*, *Impetigo mucosa*, *Tinea lactea* (Sauvages), *Tinea benigna*, *Tinea muciflua* (Alibert), *Porrigo lactea*, *Porrigo larvalis* (Willan, Bateman), *Lactumen*, *Eczema lactea*, &c., according as it was supposed to be allied to *Impetigo*, *Porrigo*, or *Eczema*. This of itself is sufficient to show the very intimate relation of these affections to each other, and to point out the necessity of considering them in their natural conditions, and in connexion with their particular seats, and with the states of vital action; and not merely with reference to certain artificial distinctions, which often cannot be ascertained, and which sometimes do not exist. The differences between *vesicles* and *pustules*, so much insisted on in the classifications usually adopted at the present time, often do not exist, or exist not in such a manner as to become available to the practitioner. These, and numerous others so implicitly received as matters of belief, may be useful as a part of the craft of the adept, but they are of very minor importance in the estimation of the truly philosophic observer, and are valued by him for just as much as they may be worth, in the particular cases in which they are manifest. An eruption may be vesicular to-day and pustular to-morrow; or, in other words, the former, owing to changes in the vital actions of the part affected, and in the morbid secretion, may pass into the latter; or both kinds of eruption may be co-existent or coetaneous, either in the same or in different situations of the same case. Instances will also occur in which the most acute observers will be puzzled to determine whether the primary eruption is vesicular or pustular; for it may be intermediate as respects the appearances both of the contained fluid and of the containing and surrounding tissues. To whatever genus this eruption may be referred —whether it be dignified in being described as a genus of itself, or be viewed as merely a species, or be debased to the rank merely of a mongrel variety—it is consolatory to know that, in its intenser states and more extended forms, as well as in slighter grades, and however great the attendant pruritus and pain may be, or however deep the chaps or fissures may seem, no permanent marks or cicatrices are produced by them.

12. *B. Impetigo Erysipelatodes* is easily distinguished by presenting, at its commencement, the ordinary symptoms of erysipelas. The other varieties of the eruption are in general unattended by any febrile disturbance, although the digestive organs may be more or less disordered. But this is ushered in by decided symptoms of constitutional commotion. Its premonitory stage is characterized by perturbation of the system, fever, much burning and smarting heat, an œdematous state of the eyelids, and a redness and puffy swelling on the upper part of the face. This state of things continues for two or three days; when, on running the finger over it, the surface, instead of the smoothness of erysipelas, is found to exhibit a slight inequality; and on minute examination it seems papular. In a day or two more it is covered with numerous psydracious pustules, which first appear below the eyes, but soon cover the greater part of the face, and sometimes extend to the neck and breast. The itching, smarting, and sense of heat which accompany these pustules are very distressing. When they break, a hot, acrid fluid exudes, which irritates, and often excoriates the sound surface on which it flows. The face remains in this painful condition for ten or fourteen days, when the discharge diminishes, and concretes into thin, yellowish scabs, in the interstices between which fresh pustules arise at intervals with renewed heat and pain, and run the same course as the former. The disease may continue thus severe and troublesome for two or three months. The period of its duration, however, is uncertain; and when it disappears it leaves the cuticle in the same dry, red, and brittle state which characterizes the departure of the other varieties of impetigo. During the progress of this disease, the health of the patient is not very much disordered, and the constitutional disturbance is much less than in erysipelas. This form of the disease is occasionally confounded with *eczema impetiginodes*. In the advanced stage, however, the distinction is easily recognised.

13. Besides the above varieties of *impetigo*, Willan and Bateman mention another under the title of *Impetigo rodens*. It is, however, of very rare occurrence, and cannot with propriety be called an impetiginous disease, being more of a malignant ulcer, complicated with psydracia. It is said to be uniformly fatal, and to have been benefited by no remedies, either external or internal, which have been employed for its relief.

14. II. Diagnosis.—The varieties of impetigo are liable to be confounded with other pustular eruptions, especially *porrigo*, *ecthyma*, and *scabies*, and with *eczema*; but a careful inspection of the pustules and of the incrustations, as either may present themselves, will show the differences between them.—*a*. The clusters of *impetigo* are distinguished from the circles of *porrigo* in not continuing to pour forth a purulent and glutinous discharge, but after the first eruption an ichorous humour, and in not forming those thick, soft, and copious scabs which characterize the latter disease. The pustules of impetigo discharge, while those of porrigo, seated more deeply, are quickly changed into dry, yellowish-coloured, cup-shaped scabs. The crusts of the former are brown or of a dull gray, and not broad, thick, nor continuous, as in *porrigo scutulata*. Impetigo of the hairy scalp is not likely to be mistaken for *porrigo lupinosa*; it does not implicate the piliferous bulbs like this and the other varieties of porrigo. It is distinguished, however, with greater difficulty from *eczema impetiginodes* affecting this part, the principal difference being in the appearance of the incrustations; but, as already insisted on, these latter are very nearly related eruptions.—*b*. The diagnosis between *impetigo* and *scabies* depends on the distribution of the eruption in patches; the copious exudation of ichor; and the reddened, rough, and fissured cuticle; and the heat and smarting which accompany the itching in the former. In the

strictly purulent scabies, the pustules rise to a much greater elevation and magnitude than in this complaint, and are filled with a thick yellow pus, and are more inflamed around their base. Porrigo and scabies are contagious; but none of the varieties of impetigo possess this property.—*c.* In its more advanced stage, impetigo may be mistaken for *psoriasis* or *lepra*; but in these there are no laminated concretions of ichorous matter or lymph, the squamæ consisting of exfoliations of morbid cuticle. These scaly diseases emit no fluid; and the existence of pustules and of a discharge, however slight, are sufficient to determine the impetiginous eruption.—*d.* The pustules of *psycosis* are larger and not so yellow, and are more isolated and more prominent than those of impetigo; which are always much crowded, and secrete abundantly. The scabs of the former are drier and of a deeper colour than the crusts of the latter, and are reproduced only after a fresh eruption of pustules. The crusts in impetigo are greenish yellow, thick, semitransparent, and reproduced without any renewal of the pustules. In psycosis, also, the pustules do not break till the fifth, sixth, or seventh day; while in impetigo they burst on the third or fourth. Moreover, tubercles and indurations are observed in the former, but not in the latter.—*e.* Impetigo is more likely to be confounded with *syphilitic eruptions* on the face; but the peculiar character of venereal desquamations, or the firmly adherent scabs, concealing ulcers and leaving indelible cicatrices, sufficiently distinguish the latter from the former. Some of the forms of eczema may be mistaken for impetigo, but the diagnosis has been fully stated in the article Eczema (§ 13). The most superficial observation will detect the very marked difference between *acne rosacea* and this complaint. Mr. Dendy states that the internal use of the deutoioduret of mercury often produces vesicles, followed by yellow or yellowish green scaly crusts, which may be easily mistaken for those of impetigo and porrigo.

15. III. Prognosis.—This is more favourable in impetigo than in *lichen*, *lepra*, *psoriasis*, *eczema*, and many other cutaneous eruptions. In whatever part of the body the disease, in its *acute state*, be situated, it generally yields to medicine in two or three weeks. Its duration in the *chronic form* cannot be stated with precision, as this necessarily depends on the constitution of the individual, the number of the eruptions, and the existence of other particular conditions, such as scrofula, pregnancy, amenorrhœa, the change of life, &c. When chronic impetigo occurs on the head, on the upper lip, or any other region covered with hair, it often proves a very obstinate and troublesome disorder; especially if the patient be of advanced age, of a scrofulous diathesis, or a shattered constitution. But under no circumstances can it be regarded as attended by danger. The sudden suppression of the more severe forms of the eruption, particularly those affecting the face and scalp of children, may, however, be productive of most serious disease.

16. IV. Causes.—Impetigo is not communicated by infection. It is most frequently observed among the poor, ill-lodged, badly fed, and filthily disposed classes. Its exciting causes are, however, sometimes obscure. Individuals of a sanguineous, or sanguineo-melancholic, or lymphatic temperament, and scrofulous constitution, with a thin, soft skin, are most liable to it. In them it is occasionally excited by violent exercise, by intemperance of any kind, or by the depressing passions of the mind, as grief, disappointment, fear, &c. It is very often preceded by headache, languor, and disorder of the alimentary canal, and cannot be traced to any other exciting cause than this disorder. Infants at the breast, and children during teething, particularly the lymphatic and scrofulous, are most liable to the varieties affecting the face and scalp. Young persons with fine skins are sometimes attacked with that of the face on exposure to a hot sun. Females, on the appearance and on the cessation of the catamenia, are also apt to be affected with this complaint. Several external causes may, however, excite pustules of impetigo by acting directly on the skin. Persons who handle irritating substances, as raw sugar, lime, or metallic dust, often have impetiginous eruptions on the hands. Bateman regards the pustules caused by the ointment of tartarized antimony, as a species of this disease; but they are of an entirely different character, and cannot be classed among any of its varieties. I believe that disorder of the digestive organs, and accumulations of mucous sordes and other secretions in the *prima via*, more commonly occasion impetigo than is generally supposed. I scarcely have seen a case in which this derangement was not manifest either before, or in the course of treatment, and in which this eruption was not evidently symptomatic of it. In this opinion I am supported by Mr. Dendy, my late colleague at the Infirmary for Children, where cases of this kind came frequently before us.

17. V. Treatment.—i. Whatever be the variety of simple impetigo, one mode of treatment is indicated. In the commencement of the disease, Willan and Bateman recommend the internal administration of *sulphur*, but not in sufficient quantity to produce purging; and if there is much inflammatory irritation of the cuticle, *soda*, *nitre*, or the *bitartrate* of *potash*, with which some of the *vegetable acids*, as *citric acid* or *lime juice*, may be advantageously combined. The indiscriminate employment of sulphur has, however, sometimes aggravated the symptoms and favoured the reappearance of the eruption. I have prescribed, with marked benefit, the *sub-borate of soda* in emollient vehicles, either with or without small doses of nitre, or of the bitartrate of potash. *Blood-lettings*, either general or local, have been proposed in extensive attacks of *impetigo figurata*, and in plethoric individuals may be of advantage; but in general they are not productive of benefit, and in persons of a weak and scrofulous habit of body are detrimental. If the eruption is attended by much fever, *calomel* and *antimonials*, or other mild mercurials, cooling *saline solutions*, and *diaphoretics* with *diuretics*, will be of service.

18. Locally, emollient fomentations, such as the decoction of mallows, digitalis, poppy heads, &c., and ablution with tepid water, are of the most essential service in the incipient stage of this disease, especially if the common saline mixture, with conium, be given at the same time. At a later period, saturnine or alkaline

lotions, and the application of the ointment of the *acetate of lead* or *oxide of zinc*, will accelerate the cure, and will be often sufficient to effect it.

19. ii. When this affection occurs in children at the period of dentition, simple cleanliness is frequently all that is required. Here the eruption is occasionally accompanied by a manifest improvement in the constitution, and it would be highly imprudent and even injurious to check or repel it. If it occurs on the hairy scalp or face (§ 10), the hair must be removed and emollient applications resorted to. Where there is much local inflammation, or in plethoric children, *leeches* ought to be applied behind the ears. *Saline purgatives*, as the sulphate of soda, sulphate of magnesia, or tartrate of potash and soda, may be given with advantage in these cases, in doses of from two drachms to half an ounce daily. If the disease, wherever occurring, proves obstinate, it has been usually treated by an alterative mercurial course, particularly PLUMMER'S *pill*, or the *hydrargyrum cum creta*, with the decoction of *sarsaparilla* or *cinchona*; but a more beneficial effect has been derived from the exhibition of five or six grains of *calomel* at bedtime, followed by a brisk *cathartic* the next morning, and a moderate dose of the *liquor arsenicalis*, taken three times a day in the decoction of *elm bark*.

20. iii. As to *local means*, almost every variety has been tried in this disease. In some instances the patient cannot bear the most soothing and emollient applications, while in others the most stimulant have been employed with advantage. Where the irritation is insupportable, the use of the *hydrocyanic acid* has been suggested by Dr. A. T. THOMSON, in the proportion of one fluid drachm to four fluid ounces of water, combined with one drachm of *alcohol*, and six or eight grains of *acetate of lead*; and subsequent experience has shown the value of this application. It soothes the irritation, and disposes the skin to regain its healthy action; but it must not be applied without caution, as cases have been recorded where it became absorbed into the system, and produced depressing effects on the constitution, with considerable intermission of the pulse. These unpleasant symptoms, however, ceased on discontinuing it. It is useless to apply any local remedies until the thick incrustations which occur in *impetigo scabida* are removed by emollient poultices, or by a weak decoction of poppies, or by exposing the surfaces to the vapour of hot water, &c. Any of the mild ointments before mentioned may afterward be applied, and the surface should be covered with pledgets of soft lint, or the whole should be touched with a solution of *nitrate of silver*; or if the skin is not very irritable, and the attendant inflammation but slight, while at the same time the disease has become chronic, the baths of Harrowgate, or artificial *fumigations of sulphur*, the hot air and *vapour baths*, and the *alkaline* and *sulphureo-gelatinous baths* will frequently both procure the removal and prevent the recurrence of the eruption. But in the more inflammatory cases, and in plethoric persons, blood-letting should precede a course of these baths. With the same intention, the baths of Barèges, Loëesche, Cauterets, Enghien, and many other Continental springs have been recommended. Great benefit has also been derived from the warm sea-water bath, especially when followed by a course of sea bathing: it should, however, be remembered that salt water is injurious during any actual inflammation. But great discrimination is always required in the treatment of this eruption. Where there are much inflammation and irritability of surface, the internal remedies should be of a cooling and sedative nature, and the external applications emollient and palliative: in an opposite state, the *arsenical solution* may be given; and slightly stimulant ointments, such as the ointment of nitrate of mercury diluted with six or seven parts of simple ointment, or an ointment of trisnitrate of bismuth may be applied. In all cases the *diet* of the patient should be restricted, and animal food taken in very moderate quantity: milk and farinaceous food are the most appropriate. Fermented liquors, spirits, and wine ought to be strictly forbidden.

21. iv. In *impetigo erysipelatodes* antiphlogistic means must be early adopted. *Purgative medicines*, especially the infusion of senna with full doses of the alkaline carbonates, and the *neutral salts* with *antimonials* and *nitre*, will materially alleviate the fever; but when the discharge is copious, and incrustations begin to be formed, the greatest benefit will be derived from the *decoction of cinchona* with *hydrochloric* or dilute *sulphuric acid*. If the disease becomes chronic, a slight alterative course of *mercury* and of *sarsaparilla* generally proves beneficial. The *solution of potash* and the *alkaline carbonates* are also serviceable, when taken in tonic infusions. The *local remedies*, which were recommended in the other forms of the disease, namely, emollient fomentations and tepid ablutions, mild ointments applied to the excoriated surfaces, and sea bathing, or sulphureous fumigation on the decline of the eruption, will also be required in this variety.

[The treatment of impetigo rarely comes under the eye of the physician at its first commencement, when the fluid which the vesicles contain is transparent (lymph), instead of opaque and purulent. We are inclined to believe, from what we have observed, that if the diseased secretion was frequently removed by ablution with warm water, while, at the same time, saline cathartics were administered, a cooling regimen enjoined, and all greasy irritating applications withheld, the disease would generally be effectually subdued within a very short time. The part should be kept moistened with cold water, or a weak solution of the acetate of lead, and covered with oiled silk to prevent evaporation. It is customary with some practitioners to resort, at an early period, to the use of sulphureous preparations, believing that they exert a specific influence in controlling the disease. There can be no doubt, however, that the attack is often aggravated and prolonged by their injudicious and indiscriminate employment in the early stages of the disease. As a general rule, they should not be employed in the commencement, and where the affection is of limited extent; all that is necessary is to confine the patient to cooling drinks, and relieve the local irritation by emollient lotions of poppy heads, decoction of mallows, flaxseed, tepid milk, or scalded bran. If the affection is attended with much inflammation, general or local bleeding will be useful, with

cathartics and emollient lotions, and an infusion of the *succory* or *chiccory*, with half an ounce of soda to the pint; general tepid bathing (the baths being made alkaline by soda or potash) and *douches* of vapour to the part will also prove beneficial, where the disease is obstinate, by changing the action of the skin. In severe cases, purging with calomel and Epsom salts will often be followed by complete success, especially if preceded by general bleeding. Mr. PLUMBE recommends, under the same circumstances, acidulated drinks, made by adding from half a drachm to a drachm of sulphuric acid to a pint of water. He also recommends alkaline, alternated with acidulous lotions, to the part affected, after clearing the diseased surfaces as much as possible from the scabs that cover them. We have found the medicinal hydrocyanic acid very effectual, in the proportion of ʒij. to half a pint of pure water, with the addition of half an ounce of rectified alcohol. After the disease has become chronic, the sulphurous preparations will prove highly advantageous, especially the natural sulphur waters of Sharon, Avon, and the Virginia Springs. A new spring, strongly impregnated with sulphuretted hydrogen, and containing only, according to our analysis, fifteen grains of saline and earthy matters to the gallon, will undoubtedly be found useful in the treatment of this and other cutaneous affections.* The water should be used both internally and externally: where the natural waters cannot be had, an artificial sulphur bath may be prepared, by adding from two to four ounces of *sulphuret of potash* to a bath. The same preparation may be used internally and as a lotion. Where the vapour *douche* is employed—and it should never be omitted in chronic cases—it should be applied for the space of from ten to twenty minutes each time. In some obstinate cases of limited extent, we have used an ointment of *ioduret of sulphur*, sufficiently strong to produce a cauterizing effect, with complete success. It should be made, for this purpose, in the proportion of twenty or thirty grains to the ounce of lard. A weak solution of the nitrate of silver, applied with a camel's hair brush, will also arrest the disease, as will the ointment of the *proto-nitrate* of mercury (ʒi. to ʒj. lard). When all other means fail, we shall be justified in resorting to the arsenical preparations. The iodides should not be omitted in chronic cases. Dr. HENDRIC has related some instances ("*Phil. Jour. of the Med. and Phys. Sciences*," p. 400) where obstinate cases of impetigo were cured by means of the expressed juice of the *Sanguinaria canadensis*, which possesses acrid and stimulating properties. Benefit might also be derived from employing the juice of others of our indigenous acrid vegetables.]

BIBLIOG. AND REFER. — *Celsus*, L. v., c. 28, n. 17.—*Aëtius*, Tetrab., Serm. iv., cap. 130.—*Avicenna*, Canon., l. iv., fen. 7, tract 3, cap 1.—*Paulus Æginus*, L. iv., c. 3.—*Riverius*, Observ. Commun., p. 661.—*Lossius*, Concil., n. 42.—*J. P. Frank*, De Cur. Hom. Morb., l. iv., p. 11.—*Forestus*, Observ. et Curat., lib. xxviii.—*Callisen*, Chirurg. Hodiern., sect. 612.—*Willan*, Practical Treatise on Impetigo, &c., 4to. Lond., 1814.—*Marcolini*, Sopra alcune Impetigini Memoria. Venezia, 1820.—*S. Plumbe*, On Dis. of the Skin, &c., 2d edit., 1827.—*A. T. Thomson*, in Lond. Med. and Phys. Journ., Feb., 1822; and in Cyclopæd. of Pract. Med., 1832.—*Bateman*, On Cutaneous Diseases, p. 208. Lond., 8vo, 1829.—*Rayer*, On Diseases of the Skin, p. 491. Lond., 8vo, 1835.—*J. Green*, Pract. Comp. of Diseases of the Skin, 8vo. Lond., 1835, p. 134.—*W. C. Dendy*, On Diseases of the Skin, p. 38. Lond., 8vo, 1837.—(See, also, *Bibliog. and Refer.* to the articles ECZEMA, PORRIGO, &c.)

[AM. BIBLIOG. AND REFER. — Am. Editions of *Plumbe* and *Cazenave*, On Diseases of the Skin.—*N. Worcester*, on Ibid. Phil., 1845.—*Hendric*, in Phil. Jour. Med. and Phys. Sciences, vol. viii., p. 400.—*Condie*, *Stewart*, *Eberle*, and *Dewees*, On Diseases of Children.—*Dewees*, *Dunglison*, *Eberle*, *Hosack*, Practice of Medicine. Only a few scattered notices of the affection have appeared in our journals.]

IMPOTENCE AND STERILITY.—SYN. *Impotentia Generandi*, *Sterilitas*; *Ἀναφροδισια*, *Anaphrodisia* (from *a*, neg., and *ἀφροδισια*, and that from *Ἀφροδιτη*, Venus), Auct. var. *Impuissance*, Fr. *Unvermögen zum Beyschlaf*, *Ohnmächtigkeit*, Germ. *Impotenza*, Ital.

CLASSIF.—4. *Class*, 1. *Order* (*Cullen*). 5. *Class*, 2. *Order* (*Good*). I. CLASS, II. ORDER (*Author*).

1. DEFIN. — *Incapacity of sexual intercourse, and inability of procreation.*

2. *Impotence* and *Sterility* are so intimately related that they must necessarily be considered under one head, although disjoined by GOOD and some other nosologists. They are subjects of much greater practical importance than has been conceived by many, and often involve the happiness and perpetuation of families. Yet have they, by a sort of professional prudery, been either entirely overlooked by medical writers, or very imperfectly discussed, and thereby relinquished to the irregular practitioner, or to the entirely unqualified empiric. In the present era of high refinement and of luxurious if not vicious enjoyments, and under the influence of noxious plans and systems of education, instances are very numerous for which medical advice is required for the removal of the morbidly disqualifying conditions about to be considered, but is not resorted to so frequently as it ought to be. Since advice is thus often necessary, the ability of those from whom the community have a right to expect it of the most judicious kind, should be equally great in providing it. There is every reason, also, to believe that it would be oftener sought after if the subject were known to be more fully entertained by the duly qualified members of the profession. The practical consideration only of these morbid conditions falls within my plan: their legal relations are very ably discussed in the classical works of PARIS, BECK, and SMITH, [as well as those of GUY and TAILOR].

3. *Impotence* may exist in either sex, but most commonly in the male, owing to the sexual conformation. *Sterility* most frequently depends upon the female, although it sometimes is owing to the male; and, in a practical point of view, if not in a medico-legal one, it is more frequently thus owing than is stated in books.

4. *Impotence* and *Sterility*, in respect of both sexes, have been differently arranged by writers—into *absolute* and *relative*; *constitutional* and *local*; *direct* and *indirect*; *permanent* and *temporary*; and, by DR. BECK, into *absolute*, *curable*, and *accidental*. These distinctions are all of importance in the consideration of the subject; but the divisions founded on the nature of the causes are more useful. M. RAIGE DELORME has arranged impotence into, 1, that depending upon lesions of the sexual organs; 2, that proceeding from disorder or interruption of seminal emission; and 3, that caused by de-

* Near Saratoga Lake.

fect of the faculty of erection. The division adopted by Dr. BEATTY into, 1. Organic; 2. Functional; and, 3. Moral; although not materially different from the foregoing, is preferable to it. I shall consider the subject with reference, *first*, to the male, and, *secondly*, to the female; and view in succession the *mental*, the *functional*, and the *organic* states, from which impotence and sterility most frequently proceed.

5. I. IMPOTENCE IN THE MALE—*Agonia, Agenesia, Impotentia Generandi Masculina, Sterilitas Paterna, Dyspermatismus, Dyspermasia*, Auct. var.—*Male Sterility*—may depend upon, 1. Mental influences or causes; 2. Functional disorder; and, 3. Organic lesions of the sexual organs. 1st. *Mental influences or causes* may occasion *temporary*, or more or less *prolonged impotence*, even in persons of a sound constitution in every respect. In them the removal of the cause leaves the generative organs in a condition capable of performing their functions. The moral or mental influences which most frequently occasion impotence are, chiefly, too eager, too violent, or over-excited desire, affections of the imagination, and the depressing passions. Fear of incapacity, or of not being loved, timidity, shame, disgust, hatred, jealousy, surprise, terror, or any of the more violent mental emotions, most commonly have this effect. The first of these causes is, however, the most frequent; and the second—the influence of the imagination—the most powerful and permanent. In former times, when superstition, and a belief in the power of magicians, of incantations, of sorcery and witchcraft, prevailed, the state of the imagination was often not only the cause, but also the cure of this affection; and, while incantations and other modes of impressing the mind were resorted to for the purpose of destroying sexual power, amulets and charms were worn, not only for the purpose of guarding against their effects, but also for the restoration of this power when lost or impaired. In the East and in Egypt, in Greece and in Rome, in uncivilized countries and in the seats of civilization, until a belief in witchcraft ceased, these means were daily resorted to, as well as others, which could operate only through the medium of the imagination. The bane and antidote were both confided in, however obscure, or impenetrable, or even absurd either of them might have been. MONTAIGNE was the first to penetrate and to expose the mystery of their operation. The twentieth chapter of the first book of his *Essays* will be read both with interest and instruction; and the thirty-seventh chapter of the second book will be found not less profitable to the practitioner of the present day. [See GUY'S "*Forensic Medicine*," Am. Ed., p. 60.]

6. 2d. *The generative function may be variously impaired*, and by diversified causes.—M. VIREY remarks, with his accustomed desire of effect rather than of accuracy, that "the genital organs offer two states during life in the young and old, which are the frozen zones of existence, the intermediate period being the torrid zone of life. The child has nothing to give, the old has lost all." Instances, however, occasionally occur of genital precocity; and those in which the function continues till a late period of life are by no means infrequent. The generative function appears with puberty, and continues until the sixty-fifth year, or even much later, unless impaired by excesses, or by local or constitutional disease. During, however, this long period, numerous circumstances tend to weaken or permanently to destroy it. The constitution and energy of the parents are sometimes the cause of the imbecility of the offspring. Children from premature connexion, or of exhausted, aged, or worn-out persons, often inherit the incapacity of their parents, in respect both of the function in question and of the system generally. Those who are thus *hereditarily* or *constitutionally* impotent are of a leucophlegmatic or lymphatic temperament; their soft solids, especially the fibrous and muscular structures, are soft, lax, and weak; their forms are rounded, from the superabundance of cellular and adipose substance; their hair is soft and fine, and deficient on the face and pubes; their frames are delicate and feminine; their voices are shrill, clear, sharp, or weak; and their testes are small and soft, the cords and scrotum being soft, lax, and pendulous.

7. Functional impotence is most commonly caused by premature or excessive venereal indulgences, and especially by the pernicious crime of manustrupatio. By these most injurious habits the organs are excited to action before they are fully developed, and the seminal fluid excreted before it is duly elaborated. The muscles concerned in the generative function, and those, also, of the lower extremities, are either imperfectly formed, or have their energy remarkably impaired, so that they become susceptible, vacillating, and ultimately nearly paralyzed. The imagination is morbidly acute or excitable, and erection imperfect, or frequent and momentary. The seminal and prostatic secretions are consequently weak, thin, clear, scanty, and serous; the whole frame, and particularly the nervous system, languish, and become enfeebled by the too frequent discharge of a fluid essentially vital, partly recrementitious, and necessary to their support; and ultimately the testes emaciate, or become soft. The variety of impotence noticed by Dr. PARIS depending upon a want of consent between the male organs of generation, or that in which erection takes place without discharge, or in which the latter takes place too quickly, and after imperfect erection, is most commonly the consequence of the causes just mentioned. But in such the evacuation consists chiefly of the prostatic fluid. General debility, from imperfect or unwholesome nourishment, may weaken the procreative energy, or render the desire less frequent, but it rarely destroys it altogether, or even for a time. Severe diseases, intense application to study, or to abstract inquiries or pursuits, have a still more remarkable effect in impairing, or temporarily destroying, the generative functions. In some instances, prolonged disuse of this function is followed by the wasting of the testes, and, consequently, permanent impotence is the result. These organs, like others of the economy, are strengthened by moderate use, are weakened by abuse; their functions being often entirely lost by protracted disuse.

8. There are various other causes which may occasion functional impotence, particularly in certain constitutions; as the use of narcotics,

especially of tobacco, hyoscyamus (Marc), cicuta, and opium. The sedative gases (Foderé), particularly carbonic acid gas, may produce it. Various refrigerants have a similar influence, as nitre, the carbonates of soda, camphor (Diemerbroeck and Lossius), and some cooling diuretics. The smell of camphor has long been considered as anaphrodisiac; and colchicum has certainly this effect, as noticed by Dr. Beatty. Soda water also exerts the same influence. The effect of these, however, are only temporary or partial. Injuries of the spine or spinal cord, or of the head, particularly the occiput (Marcellus Donatus, Fabricius Hildanus, Hennen); venæsection behind the ears (Hippocrates); arteriotomy, &c., have been considered causes of impotence. Of the influence of the first of these there can be no doubt. The use of mercury has been assigned as a cause; but it can hardly be viewed as such, unless carried to excess.

9. 3d. *Organic lesions* occasioning impotence are, (*a*) Diseases of the generative organs or of the adjoining parts; (*b*) Malformations of these organs; and (*c*) Deficiency of one or more of them. Anaphrodisia from the *first* of these is often only temporary and relative; but from the *second* and *third* it is generally absolute and permanent. *A*. The *diseases* which most frequently cause impotence are, *first*, those of the penis; *secondly*, of the testes; and, *thirdly*, of adjoining parts.—*a*. The *penis* may be so excessively irritated as to occasion a temporary impotence by obstructing the opening of the seminal ducts and the urethra. Much more frequently, however, complete or partial paralysis, or deficient energy of the nerves, and, consequently, of the muscular and vascular action of the organ, occurs, constituting the *anaphrodisia paralytica* of authors. This latter state is merely an aggravated form of functional impotence, and most commonly produced as above stated. A singular instance, in which the cells of the corpora cavernosa were apparently disorganized or altered by inflammation and suppuration, so as to prevent the influx of blood, and consequent distention of the penis, and to occasion impotence, has been recorded by Mr. Callaway. A similar change to this may take place in one side of the organ, and have nearly the same effect upon its functions.

10. Various obstructions to the seminal discharge occasion temporary or permanent impotence. The chief of these are strictures of the urethra and disease of the seminal ducts. Foderé (*Med. Leg.*, lib. i., p. 382) adduces two cases in which the powers of copulation existed, but without the seminal discharge. In one the ducts were obstructed by hard concretions; in the other they were constricted and callous. As stated by Dr. Beatty, the opening of the conjoined ducts of the vesicules seminales and vasa deferentia may be closed by scirrous enlargement of the neck of the bladder, by enlargement of the prostate gland, by scirrosity of the verumontanum, or by lesions of the duct itself. Strictures of the urethra can hardly be considered a cause of impotence, unless they are so extreme as not to permit the passage of a fine bougie. In the states of disease just mentioned, the inability of procreation arises from obstruction to the discharge of the seminal fluid, which is duly secreted; and when the obstruction is seated in the urethra, it may be removed by modern surgery. M. Foderé and Dr. Dunlop state that double scrotal hernia, by pressing upon the spermatic cords, sometimes causes as complete emasculation as if the testes were entirely removed.

11. *b*. Impotence may also depend upon organic *lesions of the testes*—upon scirrus, carcinoma, fungoid disease, or scrofula of these organs. But unless the whole structure of both organs be changed, the faculty of procreation may not be entirely or permanently lost. Uncommon smallness of these organs may occasion only temporary impotence; for this state may depend upon delayed evolution, or arise from the wasting consequent upon disuse. Mr. Wilson mentions the case of a person, twenty-six years of age, in whom the penis and testes remained of the same size as in childhood. He married at this age, and at twenty-eight the organs had reached their natural size. When, with smallness, there are remarkable flaccidity and softness conjoined, impotence is much more complete and even permanent. In a case of this kind in a strong young man, some time under my care, no benefit resulted from treatment. Severe *bruises* of the testes may be followed by wasting or disorganization of them. Dr. J. G. Smith alludes to this mode of making eunuchs, and states that it sometimes failed. I believe that most of the instances in which impotence has been said to have been produced by riding have been owing to bruises or injury of these organs, or to the pressure to which they have often been subjected. Wasting of the testes may, however, arise without any very obvious cause. In the extreme case in which I was consulted, I was unable to ascertain its source. It occurred in a most robust and muscular young man, who would not admit that he had ever had recourse to excessive or vicious indulgence, or that he had been unusually continent, until his inclination ceased with the decay of the organs. Foderé states that it was a common disease among the labourers in the canal at Arles; and Larrey, that it was not uncommon among the French troops on their return from Egypt. It has sometimes occurred as a consequence of the metastasis of *Cynanche parotidæa* to the testes. *Induration* of these organs, independently of scirrous disorganization, may be so great as to destroy their functions. According to M. Andral, the seminiferous tubes are entirely obliterated, and the structure of the organ is hard, homogeneous, and without trace of organization in cases of extreme induration. Impotence from inflammation of the testes is only temporary.

[We have observed one instance where impotence was caused by a bruise, which resulted in the absorption of the testicles; and one where the same consequence followed from the long-continued and excessive use of iodine. Chronic inflammation of the testicle from any cause may result in impotence, as from the pressure of a truss, hydrocele, metastic inflammation after mumps, a blow of any kind, &c. We sometimes meet with impotence from arrest of development of the testicle. In such cases, the individual presents the appearance of a person void of sexual characters. There are no beard or whiskers, and no hair on the

pubes. Curling mentions cases where one testis, in an adult, weighed but two scruples and one grain, whereas the average weight of a fully developed testis is six drachms. In these cases, moreover, there are no spermatozoa in the seminal fluid. Where a testis weighs less than three drachms, Mr. Curling thinks it must be regarded as in a state of atrophy. Where a testis is undergoing the process of wasting not arising from disease of the gland, it usually preserves its shape, but feels soft, having lost its elasticity and firmness. The epididymis does not usually waste so soon, nor in the same degree as the body of the testes.]

12. *c.* The *lesions of adjoining parts* occasioning impotence are, chiefly, uncommon obesity, very large scrotal hernia, and hydrocele. Neither of them requires any mark. A varicose state of the spermatic veins may also have this effect, when it is very remarkable. But I am unacquainted with cases in which this cause has been assigned.

13. *B. Malformations of the male genitals* may occasion impotence. Great size of the penis is seldom, and smallness of the organ perhaps never a cause of it, if the functions of the testes are duly performed. According to Zacchias, Fodéré, Beatty, and others, excessive size, particularly excess in length, may produce relative or temporary impotence, by injuring the female organs. The chief malformations of the penis having this effect absolutely or permanently are those in which the urethra terminates in the perineum; and even in these impregnation may be accomplished by art. John Hunter was consulted in a case of this description, and was induced, by the experiments of Spallanzani, to recommend the patient to collect the seminal fluid emitted from the perineum during intercourse, and to inject it into the vagina. Impregnation took place, and a healthy child was born in nine months.

13.* In cases where the urethra opens in a part of the penis admitting of being introduced within the vagina, impotence may exist, but it is only relative; for procreation may be effected when the opening is thus situated, whether it be on the dorsum (*epispadias*) or on the inferior surface (*hypospadias*), as more frequently observed. Numerous instances are recorded by Simeons, Belloc, Kopp, Blundell, and Fodéré of impregnation by persons in whom these malformations existed. Mr. J. Hunter met with a case in which the epididymis terminated in a cul-de-sac instead of passing to a vas deferens. Dr. Beatty states that a similar conformation sometimes exists in the vesiculæ seminales, where, instead of entering the urethra, they terminate, after being joined by the vasa deferentia, in shut sacs. When these formations of the excretory ducts of the testes exist on both sides, absolute impotence necessarily results, but they are extremely rare.

14. *C. Deficiency of one or more of the male organs* occasions absolute or relative impotence. —*a.* Congenital deficiency of the *penis* is rarely observed, and complete deficiency still more rarely. M. Fodéré mentions a case in which no vestige of the organ existed from birth. The testes were perfect, and sexual desire was not impaired. In most of the instances of congenital partial deficiency or malformation of the *penis* recorded by authors, the urinary organs presented other malformations, particularly in respect of the urinary bladder and ureters. This is illustrated by several cases in Dr. Duncan's Memoir on this subject. (*Edin. Med. and Surg. Journ.*, vol. xxv., p. 31.) *Accidental* deficiency of the penis is sometimes met with. The organ may have been either amputated or destroyed by disease. Some years ago a surgeon, a friend of the author, was sent for in great haste. He found a man in a state of syncope from hæmorrhage proceeding from a very recent amputation of the penis close to the pubis. The strictest secrecy was preserved as to the cause and mode of amputation, which had evidently been effected by a sharp instrument.

15. The glans penis, and, indeed, the greater part of the organ, may be lost without causing more than relative impotency; and possibly, nearly all of it may be removed without producing an absolute loss of the procreative faculty, if the means resorted to by John Hunter (§ 12) be employed. Instances of extensive mutilation of this organ, without destroying this power, are referred to by Frank, Paris, Beatty, and others; and although there is every reason to conclude that a complete removal of the penis will generally occasion impotence, yet the proper function of this part being to excite the female organs, and to convey the prolific fluid to the parts destined to receive it, if these purposes can be at all accomplished, impregnation may follow.

16. *b.* Congenital deficiency of the *testes* is rarely observed; and most of the cases in which these organs have been said to have been wanting are merely instances of their retention in the abdomen. When they are not found in the scrotum, their entire absence can be inferred only from the history of the case, and from the state and appearances of the patient; for when they are altogether wanting, the usual characters of the male are partially lost, and those of the female assumed. As delay in the descent of the testes may arise from some imperfection, or delay of development, as J. Hunter reasonably infers, certain of the female characters may be presented, and yet these organs may exist nevertheless. The question then is, whether or not the state of development to which they may have attained is sufficient for procreation. M. Marc adduces the case of a person of a feminine appearance, who yet possessed the full procreative power. The external characters cannot, therefore, always be confided in; but when all the external appearances of virility are present, although the testes are not found in the scrotum, there is every reason to infer that impotence does not exist; for numerous instances are on record proving that the mere retention of these organs within the abdominal ring does not affect the procreative power.

17. The congenital absence, destruction, or removal of one testis is not a cause of impotence. It may, however, be a cause of relative incompetency, and even of complete impotence, if the remaining one be soft, small, or withered. Castration, or the removal of both testes, is followed by complete and permanent impotence, if it have been performed before puberty. But, subsequently to this period, the power of procreation may exist for a very short time after

its performance, owing to the seminal fluid collected in the vesiculæ seminales previously to the operation. M. MARC supposes that the time taken for the cure of the wound is sufficient for the absorption of this fluid into the circulation; but the cases adduced by M. BOYER and Sir A. COOPER prove that a temporary power exists or is retained until the vesiculæ seminales are emptied. On this subject, the works of PARIS and BECK will be consulted with advantage, for it hardly comes within the scope of this work.

18. II. IMPOTENCE AND STERILITY IN THE FEMALE. A female may be impotent, but not steril, and she may be steril, but not impotent; for, as respects the former condition, a state of the sexual organs may exist sufficient to prevent intercourse, and yet upon its removal impregnation may take place; and, as regards the latter condition, perfect competency to intercourse may exist, and yet conception may never occur. She may also be both impotent and steril, or, in other words, were the impediment to due intercourse entirely removed, impregnation might not be effected. Sterilite is very much more common than impotence in the female, and even than impotence in the male.

19. *A. The causes of* IMPOTENCE *in the female* are an impervious state of the vagina, absence of this canal, remarkable constrictions of it, the division of it by a septum running downward from a double uterus, adhesions of the sides of the vagina, or of the labia, and the termination of the passage abruptly in a cul-de-sac. An impervious vagina may arise from changes in the soft parts, consequent upon protracted inflammation or irritation, the passage becoming first constricted or remarkably contracted, and ultimately obliterated. In a case respecting which I was consulted, a recto-vaginal fistula, seated at the upper part of the vagina, had occasioned so remarkable a contraction of the vagina that its canal was almost obliterated, its parietes having become callous and indurated. A similar result may also follow a vesico-vaginal fistula. FODERÉ believes that malformations of the bones of the pelvis may be so great as to prevent intercourse, but this can hardly be the case. Exostoses, however, on the internal or inferior surface of the bones of the pubis may have this effect, but their occurrence in this situation, and to this extent, must be very rare. Congenital absence of the vagina has been met with by VILLAUME, MOULON, SYME, and WARREN; and absence of both vagina and uterus by MOTT, DAVIS, MACFARLANE, and others. In a case adduced by FODERE, the uterus and vagina were found, upon dissection, to constitute one solid mass, without any cavity in either. In a child, examined after death by HUFELAND, no trace of genital organs, peculiar to either sex, was found, externally or internally. Although such instances are rare, there is no doubt that one or more of the different parts forming the female organs may be wanting. Congenital narrowness of this passage has been observed in a very few instances. In one or two of these, however, impregnation occurred, and the passage became enlarged in the progress of gestation. Contraction of the vagina was said to have existed in the celebrated Joan of Arc. The division of the canal by a septum has been met with in a very few cases only. Firm adhesions of the labia pudendi are not unfrequent in children, in consequence of neglected excoriation or inflammation. I have seen several instances of these adhesions of various extent, duration, and firmness. They are more rare in females after the age of puberty; but they have been met with at this age by BENEVOLI, MERRIMAN, RYAN, TUCKER, and others, and in some cases they have been so complete as nearly to prevent micturition. Inflammation or injuries, by instruments or otherwise, during parturition, have been followed by adhesion of the sides of the vagina, and total obliteration of the canal. Several of the instances of obstruction by a strong membrane placed at the commencement, or in some part of the passage, recorded by FABRICIUS HILDANUS, RUYSCH, AMBROSE PARÉ, BENEVOLI, FODERÉ, PHYSICK, and others, may be imputed to adhesions long previously formed, which have subsequently assumed an organized and membranous state, rather than to an inordinately firm and resistant hymen. The hymen may, however, be thickened and hypertrophied, and be a cause of impotence by preventing intercourse. Yet impregnation may be effected nevertheless, as proved by numerous cases. This state of the membrane is therefore not productive of absolute impotence, even should it be allowed to continue; and it is not a permament cause, as it may always be removed by an operation. Complete prolapsus or procidentia of the uterus, retroversion of the uterus, prolapsus of the vagina, cancer of the vagina or uterus, and extreme brevity of the vagina, are generally productive of impotence, although impregnation has occurred in rare instances, notwithstanding these lesions.

20. *B.* STERILITY may proceed from absence of the uterus, or of the ovaria, or of both. When the uterus is wanting, the vagina is usually short. It may also proceed from a scirrous or indurated state of this organ, from tumours in its substance, from polypi in its cavity, or attached to its neck, from occlusion of the Fallopian tubes, or adhesions of their fimbriated extremities to adjoining parts, from narrowness or entire obstruction of the os uteri, and from disease of both ovaria. Several of these require farther remark. Extreme constriction of the os uteri has been shown by Dr. MACKINTOSH to be productive of difficult, painful, or obstructed menstruation, and it most probably is also one of the causes of sterility. The mouth of the uterus may be completely obstructed by agglutination of its sides, or by a false membrane stretched across it, either internally or externally. The openings of the Fallopian tubes may be also closed by a membranous production, or by an albuminous exudation from the internal surface of the uterus. The tubes may be either partially or altogether obliterated, in consequence of the extension of inflammatory action to them from the uterus or adjoining parts. When these alterations extend to both tubes, sterility must necessarily result. Although tumours developed in the body or neck of the uterus, and polypi attached to its internal surface, generally prevent impregnation, yet instances have occurred in which conception has nevertheless taken place. These are, however, very rare, and abortion

has always occurred during the early months. A tumour or polypus may be formed on the internal surface of the uterus, and yet after its removal the patient may conceive and bear a child at the full time. A case illustrative of this has been recorded by Dr. BEATTY.

21. The above causes are mostly productive of absolute or permanent sterility; but there are others which are either relative, or admit of removal. These are, chiefly, too profuse, or too frequent, and difficult menstruation, constant or profuse leucorrhœa, inflammatory affections of the uterus or of its appendages, dislike, disgust, and indifference on the part of the female, &c. Profuse or frequent menstruation is a more common cause of sterility than is generally supposed; this state, particularly when associated with irritation of, or increased vascular determination to the womb, preventing the retention of the ovum until it has undergone the changes necessary to its attachment to the uterus. Leucorrhœa is a cause of sterility chiefly when it depends upon the inflammatory irritation of the internal surface or neck of the uterus, or when the secretion proceeds from relaxation of the vessels in this situation. When it is a consequence of inflammatory action, sterility may continue after the discharge has ceased, owing to organic changes in the surface of the uterus, or in the Fallopian tubes, especially the formation of a false membrane in the former, and the production of an albuminous exudation in the canals of the latter, or consequent obliteration of them. When barrenness depends upon leucorrhœa proceeding from local relaxation or general debility, it may be removed upon the disappearance of its cause. Delayed, retained, obstructed, or suppressed menstruation frequently occasions sterility. Some females have, however, conceived who have never menstruated; and the mere suppression or obstruction of the catamenia may or may not prevent impregnation; various other contingent changes or concurring circumstances either favouring or preventing this result. Difficult menstruation is sometimes a cause of sterility, but its influence also will depend much upon other circumstances. That form, however, of dysmenorrhœa, described by Dr. DUNCAN and Dr. DEWEES, which appears to depend upon the formation of a membranous substance in the uterus, having a strong resemblance to the decidua, is very generally productive of barrenness; but this is only one of the several forms which sub-acute or chronic inflammation of the uterus assumes, either of which may occasion temporary or permanent sterility.

22. There are other causes of temporary or relative sterility. Among these, the most common are too frequent, yet inefficient sexual intercourse, too early marriages, general ill health, and debility or exhaustion of the female organs, owing to premature or too frequent excitement. Various circumstances connected with sterility in prostitutes have, perhaps, thrown some light upon certain of the causes of this state; and particularly the fact, that many of this class have had children after marriage, or after relinquishing promiscuous intercourse. Numerous instances have occurred of females who, having been obliged to marry contrary to their inclinations, have not conceived, and yet have had children from a second marriage. It is generally understood by females of all ranks in society that indifference during intercourse, or suppression of the orgasm, will prevent impregnation; and although they are sometimes deceived in this respect, yet their inference is correct in the majority. This is one of the principal causes of the sterility of prostitutes, other circumstances, however, besides those just alluded to, combining with it to produce this effect in them.

23. III. TREATMENT. The treatment of impotence and sterility depends entirely upon the causes of either the one or the other, as far as they can be known. Many of these causes may be fully ascertained, and the consequences correctly anticipated; but as to the existence of others, inferences only can be drawn from a number of circumstances, and these inferences cannot be always fully confided in. Most of the organic lesions and deficiencies enumerated above cannot be remedied, yet a few of them may be assisted by art, either temporarily or permanently. But many of the functional and moral causes, and their effects, may be entirely removed. Absence of an organ or part essential to the function of generation in either sex is generally productive of impotence and sterility. Yet an imperfection only, and disease of one or more of these organs, occasioning either inability in the male or barrenness in the female, may be remedied. Adhesions of the prepuce to the glans penis, phymosis, strictures of the urethra, fistulous openings in the course of the urethra, some of the diseases of adjoining parts that prevent intercourse, paralytic and debilitated states of the penis, and the slighter injuries of the testes, may be permanently removed, and their consequences disappear. Contractions of the vagina, and even constriction or narrowness of the os uteri, occlusion of the entrance of the vagina by adhesions of the labia, or by a morbidly dense hymen, or by a false membrane, prolapsus or procidentia of the uterus or vagina, uterine polypi, leucorrhœa, difficult or painful menstruation, and inflammatory states of the uterus may be severally remedied, and although sterility may not be always, it will be frequently also removed.

24. Cases of impotence and sterility from moral and functional causes are the most common; and although they require the most scientific and judicious treatment, yet the mental as well as the physical imbecility that often characterizes them, brings them more frequently in the hands of pretenders and empirics, than in those of the qualified practitioner. The cases which proceed from these causes may be arranged into, 1st. Those which depend upon exhaustion; 2d. Those which proceed from disuse, or from an imperfect exertion of the function; and, 3d. Those which arise from excessive mental and physical excitement, relatively to the susceptibility and sensibility of the nervous system.—*a.* When impotence and sterility proceed from *exhaustion*, or from a premature decay of the generative functions, owing to premature, unnatural, or excessive excitement, the treatment is nearly the same in both sexes, according as either may be chiefly or solely affected. In these cases the indi-

cations are, to restore, 1st. The energies of the constitution; and, 2d. The functions of the procreative organs. To attempt the second, without either previously or contemporaneously fulfilling the first indication, will generally be futile, and often injurious. Persons who are thus exhausted sometimes perpetuate their infirmity by having recourse to noxious excitants, and to the means advised by empirics. The scientific practitioner will be guided in the selection of remedies by the causes, circumstances, and phenomena connected with the case; and he will find it necessary to associate a moral or mental regimen with the physical means which may be required. When the affection depends upon an excited imagination, in connexion with a depraved habit, the former part of the treatment is the most necessary, but the most unpleasant for the physician to prescribe, and the most difficult for the patient to adopt. In these cases the mental weakness has advanced *pari passu* with the constitutional and local infirmity, until the mind has become incapable of exerting its more reflecting and moral powers. It will, therefore, be often necessary to restore the energy of the nervous system by suitable diet, appropriate medicines, regimen, occupation, and change of air, before the moral part of the treatment will receive due attention from the patient.

25. In other and slighter cases, the debility is principally local, the general health, as well as the mental energies, remaining only partially or but little impaired. In these the local, constitutional, and moral means of cure will frequently prove successful, especially in the male. In this sex, when the inability depends chiefly upon weakness of the sexual muscles, invigorating modes of treatment, general and local, usually remove it, if its causes be avoided. In all these, attention to the digestive and secreting functions, vegetable and mineral tonics, especially the preparations of iron, and chalybeate mineral waters, the shower bath, or the cold salt-water bath, with regular exercise in the open air, mental occupation, and early hours, will generally be most beneficial. Where the patient is subject to discharges from the urethra upon passing a stool, or on the excitement of sexual desire, a turgid and irritable state of the prostate gland may be inferred. When he is liable to frequent emissions during sleep, an irritable condition of the testes, and of the *vesiculæ seminales*, obviously exists. In these, the more cooling tonics and the more astringent chalybeates may be employed, particularly the mineral acids, alone or with bitter infusions, and the tincture of the muriate of iron, aided by the regimen already stated. When the general and local asthenia are great, a moderate use of wine, of warm spices and aromatics, with as full and nutritious diet as the digestive organs can dispose of, will also be requisite. But the mental and local causes of sexual excitement should be avoided, so that the function should not be exerted beyond what may be necessary to restore and to fortify it.

26. When impotence in the male depends upon a too frequent exertion of the sexual function, the means of cure are sufficiently obvious. Yet the patient may be unable, from mental or nervous weakness, to exert the control necessary for its cure. In such a case the usual restorative remedies should be prescribed, especially chalybeates and cold sea-water bathing. In most of these, the male organs are so irritable, that their functions are performed too rapidly and imperfectly, or before the organs, more or less necessary to procreation, can be excited in the female. At the same time, the male secretions are inadequate, particularly in respect of elaboration and retention in the *vesiculæ seminales*, for the accomplishment of the purpose for which they are intended. This form of male impotence and sterility is commonly produced by masturbation, and is most benefited by whatever will improve the general health and restore the tone of the sexual organs. Attempts at intercourse in these cases should not be more frequent than may strengthen or promote the function, without exhausting or weakening it.

27. The *other states* (§ 7, 8) of functional impotence and sterility above alluded to hardly require a particular notice, as they are temporary only, and soon disappear, as circumstances generally arise which soon remove their causes. It is, indeed, chiefly to the removal of the causes that the attention of the physician should be directed in the treatment of this complaint in both sexes.

28. In ancient times, and recently in some countries, both civilized and savage, the removal of impotence and sterility by the use of heating substances, supposed to possess aphrodisiac properties, was generally attempted. The prematurely aged, worn-out debauchees, and the community generally, in some parts, especially in China, Japan, Africa, &c., often employ substances which are reputed to possess these properties. But the effects they produce, when they produce any, are more commonly injurious than beneficial. Musk, ambergris, cantharides, phosphorus, opium, the hot spices, aromatics, coffee, vanilla, borax, genseng, castor, saffron, &c., are supposed to possess aphrodisiac virtues; and a diet consisting principally of fish or shell-fish has a similar repute. Circumstances may arise in which it may be proper to prescribe certain of these as possessing stimulating and restorative properties; but others of them ought to be employed with extreme caution, particularly cantharides, phosphorus, and borax. The nostrums said to possess the virtues in question ought not to be resorted to. Certain articles of food, as pigeons, eggs, particularly raw or undressed eggs, caviare, herrings recently pickled, oysters, truffles, &c., may be employed, as being at least harmless; but the less that heating medicines are prescribed the better, unless under certain circumstances which may occur to require them; as in cases where the sexual function has not been restored after exhausting and depressing diseases, or after prolonged exertion of the mind on abstract subjects. I was very recently consulted by a gentleman about forty, who had no return of the sexual function after a severe attack of influenza a twelvemonth before. He had perfectly recovered from it in other respects for several months, and the remaining imperfection was a source of distress to him. In a case of this kind, the physician should at least know the means most likely to

be of service, particularly as the inability may become a matter of family trouble, as well as of individual misery. KÆMPFER states that a combination of musk, ambergris, opium, and aromatics, in the form of small pills, are much employed by the Chinese and Japanese as an aphrodisiac; and I believe that it is not without some degree of efficacy. But it is very obvious that the prolonged or too frequent recourse to these and similar substances is most injurious, both morally and physically.

29. The *sterility of females* must be treated with strict reference to the causes, as far as they may be ascertained or inferred. When it is chiefly functional, and induced by exhaustion, or by the noxious practices already alluded to, the means of cure are very nearly the same as have been here recommended, especially attention to the digestive and uterine functions, the use of chalybeates, or of chalybeate or other tonic mineral springs, with air, exercise, and early hours. For them also, the cold salt-water bath, the shower bath, or the salt-water *douche* on the loins, will also be of great service. The importance of a due regulation of the mind, of healthy occupations, and of abstemiousness, should be duly estimated.*

* [On the legal relations of impotence and sterility, and their bearing on questions of medical jurisprudence, the editor would refer to his additions to GUY'S *Forensic Medicine* (N. York, 1845, p. 62). Some of the causes are there, also, more particularly detailed, and remarkable cases given. "It is no easy matter to affirm," says Dr. FRANCIS, "which of the two forms of disease, impotence or sterility, is most frequently to be met with by the general practitioner, the sources of these two affections are so numerous and so various in both sexes. That masturbation in the male sex is productive of this infirmity in a greater number of cases than all the other causes generally assigned for its origin, is a conclusion which seems to be justified by clinical experience; while the numerous disturbances to which the sexual functions of the female are exposed, such as the various modifications of the monthly lustrum, amenorrhœa, dysmenorrhœa, profluvia mensium, irritability of the os uteri, leucorrhœa, affections of the ovaria, and the like, may fairly be pronounced the most frequent source of sterility or barrenness in the softer sex. Nevertheless, the practitioner who should be indifferent in scrutinizing the entire catalogue of causes which science has unfolded as adequate to the origin of this deficiency of power in the procreative organs, when medical advice is solicited in cases of this annoying kind, would prove derelict in his duty, and justly be liable to the censure of neglect. A practice of upward of thirty years has brought within my observation a large number of instances of this infirmity, both in the male and in the female. The vicious practice of self-indulgence is to be recognised as the primary origin of disability in at least eight cases out of ten, when occurring in males: mental causes, or the depressing emotions of the mind, often the sequelæ of onanism, have also a formidable agency in leading to a like result. I have known the excessive abuse of mercury to cause impotence; and two instances of this infirmity came to my knowledge, arising from the metastasis of cynancha parotidea. While the canal policy of the State of New-York was carrying on, in 1816–18–19, several of the workmen became affected with a disorder not unlike the *sivvens* of Scotland, and several of these cases terminated in disability of the generative power. I have known constitutional disturbance, originating from the bad management of syphilis, prevent conception, until the alterative action of mercury has restored the sufferer to his wonted health, and a natural secretion. The atony induced by the abuse of saccharum saturni has also led to inability to beget offspring. I am inclined to the theory sustained by numerous physiologists, that there are occasional instances of incongruity in the seminal flux with the peculiar ardour of the female; and several cases in which the female, as well as the male, were in good health, though without children, have, by a second marriage on either part, proved prolific. Several cases are known in this city where the venereal congress has been followed by fecundation by individuals with only one testicle; and in a remarkable example, where it was conceded by several competent judges that three testicles existed, the generative act was not crowned with pregnancy. That excess in the venereal orgasm, even when properly and naturally performed, will sometimes fail of the object most desirable, is also an admitted fact. The depressing influences of prevailing epidemics, as influenza, cholera, and the like, are known to have induced extreme indifference to sexual gratification, and lead to inability in the generative act for some time after their general prevalence: this is well known as to the Asiatic, or malignant pestilential cholera. RUSH inclines to rather an opposite opinion with regard to yellow fever; but that disease, from its constitutional action, has, in many cases, manifested its noxious agency in torpifying the genitals for many months. I am aware of a formidable enlargement of the kidneys extinguishing the venereal propensity; and three cases of diabetes mellitus, for which I prescribed, were accompanied by impotence. Neither cases of epispadia nor hypospadia are necessarily fatal to successful venereal intercourse. BELLOC mentions a case where an individual affected with this last-named infirmity proved, nevertheless, the father of four children. I am apprized of a like case where the sufferer is the father of two children; and Dr. MOTT is aware of examples of a similar nature. The most frequent sources of barrenness or sterility in the female may be considered as associated with the disordered condition of the monthly period, and of these the most common are amenorrhœa, dysmenorrhœa, an immoderate flow of the menses, or their too frequent occurrence, leucorrhœa, and its divers causes, physometra, and disease of the os tincæ. Dysmenorrhœa, accompanied with the formation of the deciduous membrane, almost invariably prevents conception. I have become acquainted with but five cases as exceptions. I have never known physometra allow of pregnancy until the original disorder was removed. A reference to the individual causes of this defect in the female, as well as those occurring in the male, is indispensable to a successful treatment of these infirmities. The triumphant results of the administration of several forms of iodine gives cheering views of the issue of many of these sources of trouble in the tender sex, inasmuch as we find the constitutional influence of the several preparations of iodine and the iodurets to be of saving efficacy in numerous uterine maladies. I have known three instances of extensive ovarian dropsy existing, and pregnancy, nevertheless, to ensue: hydatids of the uterus have been removed, and pregnancy has followed venereal congress. In the case of a lady, aged thirty-three, the mother of three children, a tumour of the internal cavity of the womb, growing from the fundus, did not prevent conception. I delivered her of a well-formed living child at the usual termination of the period of gestation. The remedial powers of the tincture of cantharides I have tested with the happiest effects, more particularly in the male subject, and none, I believe, will be reluctant to admit the vast importance of the practical precepts recently urged by LALLEMAND with regard to caustic applications. The armed bougie is sometimes indispensable to the male urethra, where the atony is not to be controlled by ordinary measures. I am convinced that our apprehensions of the direful consequences of the lytta, when given internally, are more imaginative than real. I have used it with great freedom in a vast number of cases for long periods, with demonstrative evidence of its potency, and also of its harmlessness. Blended with the terebinthinates, cold bathing, pleasurable exercises of the mind, and fortified at all times by such advice as removes despondency and invigorates hope, the victim of impotency is often released from the horrors of despair and restored to his virile functions."]

BIBLIOG. AND REFER.—*Aëtius*, tetrab. iii., serm. iii., c. 35; and tetrab. iv., serm. iv., c. 26.—*Paulus Ægineta*, L. i., c. 36; l. iii., c. 58.—*Avicenna*, Canon., l. iii., fen. 20, tract i., cap. 15.—*Augenius Horatius*, t. ii., *ep.* 62.—*Montaigne*, Essays, &c., t. i., c. 20.—*Trincavellius*, Consil., l. iii., n. 78.—*Akakia*, De Morb. Mul., l. ii., c. 16.—*Mercurialis*, Consil., t. i., n. 48; and t. iii., p. 3.—*Mercatus*, De Morb. Mul., l. iii., c. 5.—*Zacchias*, Quæst. Med. Leg., l. iii., tit. i., quæst. i., *seq.*—*Tagereau*, Discours sur l'Impuissance de l'Homme et de la Femme, 8vo. Paris, 1611.—*J. à Pratis*, De Arcenda Sterilitate et Progignendis Liberis. Amstelod, 12mo, 1834.—*Ballonius*, Cons. ii., n. 26; iii., n. 6, 20, 21, 28.—*Amatus Lusitanus*, cent. ii., cur. 19; cent. vi., cur. 95.—*Zacutus Lusitanus*, Med. Pr. Hist., p. i., l. iii., n. 18; et Prax. Admir., l. ii., obs. 120, 123, 124.—*Bonet*, Sepulch., l. iii., s. xxiv., obs. 5.—*Schurig*, Gynæcologia, p. 223; et Spermatalogia, p. 506, *seq.*—*Zwinger*, Theatrum Vitæ Humanæ, p. 512.—*Bartholinus*, Epist. Med., cent. iii., ep. 10.—*Ettmuller*, De Seminis Excretione et Retentione Læsâ, opp. v., t. ii., p. i., p. 897.—*De la Peyronie*, in Mém. de l'Acad. de Chirurgie, t. i., p. 430.—*Petit*, in Ibid., t. i., p. 434.—*Morgagni*, De Sed. et Caus. Morb., *ep.* xlvi., art. 5, *seq.*; et Opusc. Miscellan, p. 34.—*Kæmpfer*, Amœnit. Exoticæ, Fasc. i., p. 19; Fasc. iii., obs. 16, p. 654.—*Hufham*, in Philosoph. Transact., vol. xxxii., p. 408.—*Taschenbuch*, für Freunde der Gesundheit, ad., 1785, p. 94.—*Sauvages*, Nosolog. Meth., t. iii., p. ii.—*J. Smith*, Treatise on the Venereal Disease. Lond., 1788.—*Herholdt*, in *Arnemann*, Magazin für die Wundarzneyk, b. ii., p. 112.—*Federé*, vol. i., p. 361, &c.—*Mahon*, vol. i., p. 52, 54, 55, 57.—*K. F. Burdach*, Eugon Order über Impotenz und Schwäche

der Zeugungskraft, &c., 8vo. Leipzig, 1804.—*Hülfsbuch*, für Alle, die an Schwäche der Geschlechtstheile leiden, 8vo. Hamburg, 1807.—*Hufeland*, Journal der Practischen Heilkunde, b. ix., st. 3, p. 107.—*J. P. Frank*, De Cur. Hom. Morb., l. v., p. 45, et p. 253.—*Schneider*, Journ. des Progr. des Sc. Med., t. viii., p. 258 (*erectio nulla, sed pollutiones noct.*).—*A. B. Granville*, in Lond. Med. Repos., vol. viii., p. 347.—*Callaway*, in Ibid., vol. xxi., p. 286.—*J. Copland*, in Ibid., vol. xxv., p. 106.—*Gunther*, in Ibid., vol. xxv., p. 185.—*Renauldin*, in Ibid., vol. xxvi., p. 78.—*Stein*, Annals of Philosophy, vol. xvi., p. 114.—*Coats*, in Edin. Med. and Surg. Journ., vol. i., p. 39.—*A. Duncan*, in Ibid., vol. i., p. 43 and 132.—*A. Cooper*, in Ibid., vol. i., p. 128.—*Pears*, in Ibid., vol. iii., p. 105.—*Conquest*, in Ibid., vol. vii., p. 23.—*Maclure*, in Ibid., vol. xxi., p. 315.—*Maitland*, in Ibid., vol. xxv., p. 31.—*Vernon*, in Ibid., vol. xxvii., p. 81.—*Syme*, in Ibid., vol. xxxii., p. 246; vol. xxxiii., p. 243; et vol. xxxvii., p. 337.—*Stedman*, in Ibid., vol. xxxvii., p. 26.—*Houston*, in Ibid., vol. xxxviii., p. 266.—*Turnbull*, in Ibid., vol. xxxix., p. 128.—*Edwards*, in Ibid., vol. xli., p. 403.—*Paris*, Medical Jurisprudence, vol. i., p. 205.—*Duchachet* and *Drake*, in New-York Med. and Phys. Journ., vol. v., p. 443.—*Hosack*, in Ibid., vol. ii., p. 12.—*V. Mott*, in Ibid., vol. ii., p. 19.—*M'Naughton*, in Ibid., vol. vi., p. 252.—*Moulen*, in Amer. Journ. of Med. Science, vol. ii., p. 193.—*Ashwell*, in Ibid., vol. iv., p. 149.—*Williams*, in Ibid., vol. xi., p. 408.—*Hoillemin*, in Ibid., vol. xv., p. 407.—*Barret*, in *Drake's* Western Med. and Phys. Journ., vol. iii., p. 206.—*Dewees*, On the Diseases of Females, p. 43; and in *Coxe's* Medical Museum, vol. i., p. 165.—*Littel's* Monthly Journ. of Foreign Med., vol. i., p. 189.—*Villeume*, in Ibid., vol. i., p. 376.—*Hayward*, in Boston Med. Magaz., vol. i., p. 91; and in Amer. Journ. of Med. Science, vol. xiii., p. 79.—*Hamilton*, in Bost. Med. and Surg. Journ., vol. xi., p. 93.—*Lasserre*, in New-England Journ., vol. ix., p. 161.—*Delpech*, in Med. Chirurg. Rev., vol. xvii., p. 553.—*A. Cooper*, in Ibid., vol. xviii., p. 389.—*Macfarlane*, in Ibid., vol. xxii., p. 450.—*R. Hamilton*, in Transact. of the Royal Society of Edinburgh, vol. ii., art. 9.—*Marc*, in Dict. des Sciences Médicales, t. xxiv., p. 176.—*Hennen*, Military Surgery, 2d edit., p. 303.—*Brewster*, Edinburgh Encyclopædia, vol. i., p. 825.—*Wilson*, Lectures on the Urinary and Genital Organs, p. 408 and 424.—*Chapman's* Journal, N. S., vol. iv., p. 34.—*Baillie's* Morbid Anatomy, p. 371.—*Eberle's* Med. Review, vol. ii., p. 394.—*Dorsey's* Surgery, vol. ii., p. 368.—*G. Lee*, Ecclesiastical Reports, Appendix, vol. ii., p. 580.—*Raige Delorme*, Dict. de Médecine, t. xii., p. 74.—*Blundell*, in Lancet, N. S., vol. ii., p. 771.—*Elliotson*, in Ibid., vol. viii., p. 55.—*Macfarlane*, in Ibid., vol. x., p. 624.—*Liston*, in Lond. Med. Gaz., vol. vi., p. 252.—*Earle*, in Ibid., vol. x., p. 8.—*Dupuytren*, in Ibid., vol. xi., p. 128; et vol. xiii., p. 878.—*Pereira*, in Ibid., vol. xix., p. 447.—*Hurd*, in Lond. Med. and Surg. Journ., vol. iv., p. 323.—*M. Ryan*, in Ibid., No. 170, p. 422.—*G. Langstaff*, in Medico-Chirurg. Transact., vol. viii., p. 505.—*W. Russell*, in Ibid., vol. xi., p. 445.—*Arnott*, in Ibid., vol. xii.—*T. E. Beatty*, Cyclop. of Pract. Med., vol. ii., p. 594.—*Andral's* Pathol. Anat., vol. ii., p. 414.—*Gooch*, On Midwifery, p. 8 and 45.—*Good's* Study of Medicine, vol. v., p. 7.—*Burns*, A Treatise on Midwifery, &c., chap. iv., note 47.—*Denman*, Midwifery, p. 148, 149.—*D. D. Davis*, Obstetric Medicine, vol. i., p. 513.

[AM. BIBLIOG. AND REFER.—*George Bushe's* Med. Chir. Bulletin, vol ii., p. 1.—*Gross*, in West. Journal Med. and Physical Sciences, vol. x., p. 46.—*Fish*, in Bost. Med. and Surg. Jour., vol. xv., p. 268.—*White*, in Baltimore Med. and Surg. Journal, vol. ii., p. 314.—*Mussey*, in Am. Jour. Med. Sciences.—*Hopkins's* Chancery Reports, vol. i., p. 557.—Revised Statutes of the State of New-York, vol. ii., p. 142, 143.—*Paige's* Chancery Reports, p. 554.—*Griffith's* Ryan, p. 111.—*C. A. Lee*, Am. Ed. of *Guy's* Forensic Medicine, Art. Impotence.—Laws of New-Hampshire, 1830, p. 157.—Revised Laws of Illinois, 1833, p. 233.—Revised Laws of Indiana, 1831, p. 213.—Digest of Laws of Tennessee, 1831, p. 74.—Laws of Missouri, 1825, p. 329.—*Wright's* Ohio Supreme Court Reports, p. 518.—*R. Dunglison*, in Am. Med. Intelligencer, vol. i., p. 138.—*Pancoast*, in Ibid., p. 147.]

INDIGESTION.—SYN. Δυσπεψια (from δυς, *with difficulty*, and πεπτω, *I digest*), βραδυπεψια, απεψια, Gr. *Concoctio tarda, Stomachi resolutio, Cruditas, Indigestio, Passio Stomachia*, Auct. Lat. *Apepsia*, Vogel. *Soda*, Linnæus. *Anorexia*, Sagar. *Bradypepsia*, Sauvages. *Dyspepsia*, Swediaur, Cullen, Parr. *Dyspepsia Simplex*, Young. *Limosis Dyspepsia*, Good. *Schwere Verdauung, Uebel Verdauung*, Germ. *Indigestion*, Fr. *Indigestione*, Ital. *Bad digestion, Slow digestion, &c.*

CLASSIF.—2. *Class*, Nervous Diseases; 2. *Order*, Defect of Vital Energy (*Cullen*). 1. *Class*, Diseases of the Digestive Function; 1. *Order*, Affecting the Alimentary Canal (*Good*). I. CLASS, I. ORDER (*Author in Preface*).

1. DEFIN.—*Impaired or fastidious appetite; slow and difficult digestion; sensations of discomfort referrible to the stomach, and frequently costiveness.*

2. *Dyspepsia* or *indigestion* has been employed as the generic designation of several disorders ranged under it as species by most modern writers, and particularly by SAUVAGES and CULLEN. YOUNG and GOOD have limited the meaning of the term, by considering some of those disorders as altogether distinct from it. Dr. TODD, however, in an able and comprehensive article on the subject, has applied this term to all the functional disorders of the alimentary canal. Having discussed several of the affections viewed by some writers as species of indigestion in separate articles, according to their natures and seats (see articles CŒCUM, COLON, COSTIVENESS, DUODENUM, FLATULENCY, PYROSIS, STOMACH, *Painful affections and inflammation of*), my observations, at this place, will necessarily be confined to the simpler forms of this disorder.

3. *Indigestion* is either *primary* or *secondary*, *idiopathic* or *symptomatic*, *simple* or *complicated*. When it is *complicated*, it may have been either the primary or the secondary affection. Dr. TODD distinguishes between symptomatic and sympathetic dyspepsia; and remarks that "a *secondary* dyspepsia may be conveniently divided into *symptomatic*, forming only a part of a more general disease, and *sympathetic*, the consequence of consent with the disorder of some other organ." The distinction is, in some respects, wanting in precision, but it may be preserved as being one usually recognised.

4. The *varieties* or *forms* of indigestion have been variously described, named, and arranged by the numerous recent writers on this disorder; and a most eager disposition has been evinced by all to assign new terms, and to devise distinct pathological states for each. In some instances, distinctions have been multiplied to an extent bewildering the inexperienced, and beyond the actual morbid manifestations of the organs affected. It will be readily admitted that different forms of indigestion will depend upon different states of the stomach, and of its associated viscera; that, in one, the organic sensibility will be especially affected; in another, the secretions; in a third, the muscular contractility; in a fourth, the circulation; in a fifth, two or all of these functions; and that these particular affections will be variously associated with disorders of the liver, or of the pancreas, or of the duodenum, and not merely with these, but with others in remote organs. Yet these individual affections, even in their simpler or less complicated states, will seldom be manifested by symptoms enabling the most close observer to determine with precision which of them is the one actually present, either in a simple or predominant form, or the exact associations to which it may have given rise. It will, therefore, be proper not to multiply distinctions beyond those which will be found useful for practical purposes. The disorder which proceeds from a simple diminution of the functions of the stomach, from impaired secretion, weakened organic contractility, and

languid circulation, from asthenia of the organ, will, with propriety, form one variety of indigestion; and that which depends upon a state of erethysm, or vascular irritation, approaching, but not amounting to inflammation of the villous surface, will constitute another. This latter, especially, will present certain modes, according as the sensibility, the villous membrane, or the follicular apparatus is prominently affected. Those states of disease which are generally consequent upon dyspepsia, although sometimes appearing independently of it, and which have been classed by some writers as severer forms of this complaint, will be found under the heads referred to above.

5. I. Description.—i. Simple Asthenic Dyspepsia—*Stomachi Resolutio*, Celsus; *Frigiditas Stomachi*, Prosper Alpinus; *Dyspepsia Idiopathica*, Cullen; *First Stage of Indigestion*, W. Philip; *Atonic Gastric Dyspepsia*, T. J. Todd; *Dyspepsia per Asthenie de l'Estomac*, Andral; *Dyspepsia Apyrétique Asthénique*, Broussais—is *characterized* chiefly by a sense of distention of the stomach, by acrid or acid eructations, and flatulence soon after a meal; by loss of appetite, or loathing of food, and occasionally by nausea. These symptoms, however, vary with the nature and quantity of the food. Heartburn, nidorous or putrescent eructations, and a feeling of weight or oppression at the epigastrium, are generally present after a very full meal, particularly of fat, oily, or rich meats. The tongue is pale, flabby, whitish, slimy or coated, and often indented by the teeth; the bowels are costive, sometimes irregular; the urine is pale, copious, and occasionally deficient in urea, or contains albumen; the pulse is softer, weaker, and often slower than natural; the temperature is diminished, or irregularly distributed, the extremities being cold, and the surface pale or flaccid; the eyes are languid, and the physical and mental powers deficient in vivacity and energy. The symptoms, however, vary much in grouping and intensity with the kind, quantity of the solid and fluid ingested, with the temperament and constitution, and with the manner in which associated viscera are sympathetically affected. In some cases, they are gradually and very slowly developed by the continued operation of the causes; in others they are more rapidly or suddenly induced by errors in diet, or by other powerful circumstances.

6. *A.* The latter, or the *more acute* and *sudden attacks of indigestion*, are generally consequent upon some manifest cause, particularly an overloaded state of the stomach, and is identical with the *cruditas* of the ancients and the *embarras gastrique* of the French. It may occur, however, from substances which disorder the organic sensibility of the viscus, or from other causes. When it proceeds from this source, the symptoms soon follow a full meal, or appear in the morning. The patient experiences various uneasy or even painful sensations, with oppression or weight at the epigastrium, and heartburn. These often extend to the pharynx. The tongue becomes dry, clammy, or loaded, and the taste is lost or perverted. Rancid, oily, indigested, or acid substances are eructated or brought off the stomach, without nausea or retching. There are generally headache and languor. If nausea and vomiting take place, the contents of the stomach are thrown up, either partially or altogether undigested, with a ropy phlegm. Where vomiting does not occur, a sense of irritation or constriction of the fauces and pharynx, with a copious secretion of a watery fluid, and pains in the stomach, are often present. The appetite is abolished, or savoury articles of food are only relished. When the fit of indigestion occurs during the night, the patient experiences frightful dreams, or the nightmare, or spasmodic twitchings of the limbs, or severe pains in the stomach or bowels, or wakens with severe headache. The pulse is weak, languid, or soft; the skin cool and moist, and the extremities cold. Frequently chills, horripilations, formications, or even slight shudderings, occur. Various sympathetic affections often attend this state of dyspepsia, particularly headache, as described in that article, impaired or indistinct vision; muscæ volitantes, noises in the ears, and dullness of *hearing*; disorder or impairment of the senses of taste and smell, palpitations, and vertigo; colicky pains in the abdomen, costiveness, &c.

7. An attack of dyspepsia in an acute or sudden form seldom appears, unless from the causes just alluded to. But it may proceed, particularly in delicate persons or females, from other causes, as powerful mental impressions, long fasting, or deprivation of wonted stimuli. In such cases, vomitings, or even retchings, rarely occur; but nausea or disgust at food, giddiness, headache, faintness, sinking or pain at the epigastrium, costiveness, pallor and coldness of the surface, and inactivity, with irritability of temper, with some of the other symptoms already noticed, are commonly complained of. These *acute* attacks are liable to pass into the more *confirmed* or chronic state of the complaint, next to be described, particularly when they recur frequently or are neglected.

8. *B.* The *confirmed* or chronic form of dyspepsia may take place gradually or slowly, or as a consequence of the foregoing. In the former case, it is almost imperceptible in its progress, but it generally commences with symptoms of general as well as local debility. All the physical and mental functions betray more or less inactivity. The sleep is disturbed or unrefreshing, sometimes heavy or prolonged. The appetite in the morning is impaired and capricious, savoury articles being chiefly relished, and a sense of soreness or relaxation in the throat is often complained of. A full meal is followed by heaviness, yawnings, stretchings, and an almost irresistible disposition to sleep, by sense of fulness, weight, flatulence, or by rancid or acrid eructations, &c. As the disorder continues, the appetite is more impaired and more capricious. The bowels become costive or irregular; the discharges being scanty, offensive, discoloured, or more copious or frequent, and sometimes containing imperfectly digested portions of food. The biliary secretion is either insufficient or disordered. Perspirations are copious on exertion, often offensive, and quickly discolour the linen. Flatulence is troublesome, particularly when the stomach is empty; the mouth is clammy, and the tongue loaded or furred, especially in the morning. The countenance becomes pale or unhealthy; and the body occasionally enlarges about the

trunk or abdomen. Vertigo, loss of memory, lowness of spirits, apathy, indifference; and numerous associated and sympathetic disorders supervene, according as the asthenia of the stomach extends to the duodenum and intestinal canal, or to the secreting collatitious viscera. In many cases the affection extends along the œsophagus to the pharynx and fauces, occasioning the slightest forms of angina, or simple relaxation of the uvula.

9. As dyspepsia becomes confirmed, various additional sympathetic affections appear. Indeed, there is scarcely a viscus that may not betray disorder. Irritation about the larynx, chronic cough, particularly in the morning; huskiness of the voice, or hoarseness; copious perspirations, and eruptions on the skin; dry and parched state of the hair, or morbid condition of the cuticle and of the nails; great sensibility of cold, and also of heat, are very commonly observed. Shortness of breath on slight exertion; palpitation of the heart; intermissions and irregularity of the pulse; and other sympathetic disorders about to be noticed, often also appear. This variety of indigestion, when neglected, or when its causes continue in operation, sooner or later passes into one or other of the forms of the variety next to be described.

10. ii. Indigestion with vascular Erethism —*Irritative Dyspepsia; Cardialgia Inflammatoria*, Sauvages; *Gastrite Chronique*, Broussais; *Second Stage of Indigestion*, W. Philip; *Inflammatory Gastric Dyspepsia*, T. J. Todd—is *characterized* chiefly by slow and painful digestion, a sense of heat and discomfort at the epigastrium, increased by food and by pressure, with thirst, dryness of the mouth and fauces, redness of the edges and point of the tongue, while the middle and root are white, loaded, or furred; costiveness, high-coloured urine, partially increased temperature and dryness of the skin, and a more frequent and sharp pulse than natural. It offers several *grades* of severity and various *modes*, according to the exciting cause, the temperament of the patient, and to the manner in which the organic sensibility and contractility, the secretions and associated viscera, are individually implicated. It may appear suddenly in an acute form, when the cause has been active, or gradually and slowly, either primarily or consecutively, upon the variety already described.

11. *a.* In the *slighter states* of irritative dyspepsia, the appetite is often increased, occasionally ravenous, in some instances impaired; thirst is generally present, particularly in the evening. The extremities are often cold; but burning or heat of the soles of the feet and palms of the hand frequently occur, particularly in warm or temperate weather. The point and edges of the tongue are red, the papillæ raised or excited, and the root more or less loaded; the bowels are confined, and the stools dry and scanty. The pulse is somewhat excited, especially in the evening, and rather sharp than hard or contracted. Headache, sometimes with slight redness of the conjunctiva and contraction of the pupils, heaviness, unsound sleep, unpleasant dreams, and a feeling of fatigue and lassitude upon waking, are generally present. The symptoms referred directly to the stomach, at first, are often not more severe in this than in the preceding variety; and pain, with tenderness on pressure, is not more frequently complained of. As the complaint, however, becomes more chronic, a burning pain is felt at the stomach, and is increased by a full meal and by pressure. Great discomfort and a sense of a load are referred to the region of this organ. Fulness or distention at the epigastrium, often extending to one or both hypochondria, is usually present. When heartburn occurs, it is characterized by a sense of heat or burning, and attended by redness and soreness of the fauces and pharynx. The tongue and throat are frequently dry, and the voice soon becomes husky on speaking, or on exerting it. Small vesications occasionally appear on the sides and points of the tongue, and more rarely excoriations on the fauces. In protracted cases, the tongue is often smooth, sometimes slightly fissured or chapped, or lobulated, or even glossy. Pain is felt in the left shoulder, or in the left hypochondrium, extending to the shoulder blade, or between the scapulæ, and beneath the sternum. Severe headache; irritability of temper; depression of spirits; impaired appetite; palpitations; a harsh, dry state of the skin, frequently with scaly eruptions; occasional bursts of perspirations during sleep; inability to lie on the left side; burning heat in the palms of the hands and soles of the feet; increased acuteness of the senses, or obscuration of certain of them, and a morbid state of all the excretions, severally appear, and often divert the patient's and practitioner's attention from the source of disorder. In some cases pain, often increased by flatulence, shoots through the hypochondria and chest, and a symptomatic cough, with slight grayish expectoration in the morning, is excited, owing to nervous connexion, and to the extension of irritation to the pharynx and top of the larynx. In these, pectoral disease is sometimes suspected; and inflammatory irritation of the larynx may be actually thereby occasioned.

12. *b.* In the more *severe or acute attacks* of this variety of indigestion, particularly when produced by hurtful or indigestible food, or stimulating liquors, there is a total and sudden loss of appetite, with nausea, retchings, or full vomiting, increased by, or instantly following the ingestion of substances into the stomach. Occasionally the contents of the organ are regurgitated without effort or nausea, but with pain or a sense of constriction at the epigastrium and hypochondria. The pulse is, at times, but little affected; at others, quick and sharp, and the skin is harsh and hot; but perspirations break out when free vomitings are induced. There is always thirst; pain, or a sense of burning, of scalding, or of soreness is generally felt in the stomach, and it often extends, in the course of the œsophagus, to the throat, giving rise to a similar symptomatic affection of this part, and of the larynx and chest, as just noticed (§ 11). In rare instances, however, where the retchings and vomitings are frequent and severe, but little pain, and no tenderness in the epigastrium are present, or much less than the severity of the symptoms indicates. The copious discharge from the mucous follicles and exhalants of the villous coat, in these cases, removes the congestion of vessels, or the morbid conditions productive of pain and tenderness in other cases. But the symptoms vary re-

markably with the exciting cause, with the temperament and disposition of the patient, and with the previous disorder and existing state of the collatitious viscera.

13. *c.* In the *aged*, or in *young persons of a phlegmatic temperament*, and in *cold* or *damp climates* and *seasons*, irritative dyspepsia assumes a form which has been denominated *Anorexia pituitosa*, *Anorexia Catarrhalis*, *Catarrh of the Stomach*, &c., by various writers. Dr. Todd has called it *Follicular Gastric Dyspepsia*; and most probably it proceeds from an inordinate and morbid secretion from the follicles of the stomach that irritates the organ; but he has improperly confounded it with *Pyrosis*, which it closely resembles. It is characterized by an aching pain, by gnawing, or by a sensation of cramp, weight and uneasiness, or soreness, felt chiefly in the morning, when the stomach is empty, by loss of appetite, nausea, and sometimes by vomiting of a ropy, transparent, glairy, and tasteless fluid. It is often complicated with, or consequent upon severe catarrhal affections of aged or phlegmatic persons, and is not infrequent in rheumatic constitutions, after errors in diet, and the use of indigestible, rich, or incongruous articles of food or drink. In this case it usually occurs in the night and following morning. Along with indigested substances, a very large quantity of this colourless glairy matter is thrown up, and often continues to be ejected for a considerable time afterward. M. Andral has seen it thrown off in very large quantities, independently of the irritation of offending matters; but these matters are more commonly concerned in keeping up the morbid secretion. In most of the cases I have seen the pulse was soft, languid, sometimes sharp during the attack, which was attended by a foul, loaded, or sodden state of the tongue,* a warm perspirable surface, or free perspiration, much depression of nervous power, and constipation; but there was little or no thirst, nor tenderness or increase of pain on moderate pressure of the region of the stomach. Flatulence, eructations of an insipid or slightly acid fluid, a copious flow of saliva from the mouth, or of a watery fluid from the pharynx, and oppression or distention of the stomach, although pain is much abated, after eating, generally accompany the disorder. This form of irritative dyspepsia is often preceded or attended by severe catarrhs, by dyspnœa, or humoral asthma, or by rheumatic affections; and it is most common in cold and wet seasons, when these are prevalent. In its slighter or less acute states, or when appearing independently of over-distention or irritation of the stomach by bulky or indigestible substances, the pulse is usually slow or soft, the extremities cold, the evacuations scanty or mucous, and the tongue white, sodden, or loaded. As Dr. Todd remarks, there is a frequent desire to take food, with thirst, and, as the disease continues, there is wasting of the flesh. The uneasiness caused by the laborious digestion subsides as the process is finished; but before the time of taking food arrives the stomach becomes irritated by its own secretion, which produces all the inconvenience of a foreign indigestible substance in that organ; such as a sense of sinking, of dragging, of nausea, faintness, gnawing, or erosion, which are again, for a time, relieved by the taking of food. (See art. Pyrosis.)

14. iii. Of certain Symptoms of Indigestion. —*A. Cardialgia*, or *Heartburn*, presents itself in two forms, each of which assumes various grades of severity. It is generally attended by *acid* or acrid eructations, exciting irritation in the throat and fauces. The acidity of the eructated matters is often remarkable, occasioning the most unpleasant sensations in the mouth and pharynx, with a copious flow of fluid from those parts. The matters brought up from the stomach are sometimes rancid and *alkaline*, particularly after a full meal of rich or fat animal food. In this case a feeling of disgust is excited on each eructation, and large quantities are thus thrown off, or regurgitated from the stomach, without either nausea or retching. In either form, unpleasant gnawing, burning pain, and tenderness, are felt at the epigastrium, with distention, extending to the hypochondria, and with tightness or oppression in the chest. Cardialgia chiefly occurs during the period of digestion, but sometimes not until an advanced stage of the process. It may be mild, and consist simply of uneasy sensation, gnawing, or burning at the cardia, sometimes with slight faintness or flatulence; or it may be severe, the uneasiness extending over the region of the stomach, attended by depression, anxiety of countenance, and faintness. This latter state has been denominated *sinking heartburn*. It is only when cardialgia is severe that it is accompanied with frequent and copious, rancid, alkaline, or septic eructations.

15. *B. Of the Evacuations*, &c.—*a.* The *stools* furnish comparatively little information in dyspeptic ailments, when only those procured by an active purgative are examined. They are most commonly scanty, dry, and deficient in healthy odour and colour, especially in the asthenic and simple states of the complaint. In the irritative states the discoloration is often greater, and they are occasionally mucous or watery, particularly when irritation extends along the alimentary canal. But in either variety they vary remarkably in colour, consistence, and character; being either dry, pultaceous, slimy, scybalous, mucous, bilious, clayey, whitish, or yeasty, and sometimes presenting several of these appearances at the same time. The calls to evacuation are commonly rare or delayed, but they are occasionally frequent and inefficient. It is chiefly when torpid or disordered function of the liver, duodenum, or intestinal canal is associated with indigestion that the states of the evacuations described by Dr. W. Philip are met with; for these states, as Dr. J. Johnson justly contends, are not common in the simpler forms of the complaint. "The alvine discharge," the former writer re-

* [It is the opinion of Louis, Andral, and other pathologists, that there is no direct relation existing between the state of the tongue and the state of the stomach in disease; in other words, that the former does not afford any certain evidence of the condition of the latter. We certainly observe, in some instances, a clean tongue when there are strongly marked symptoms of grave disease in the stomach; and it is no less true that we find the tongue coated or covered with aphthous crusts, or red and smooth when there is no evidence of decided gastric affection. The latter state of the tongue, moreover, exists sometimes in gastritis, but it often arises from a purely local affection of the tongue itself. Thus we may have a clean tongue with a diseased stomach, a diseased tongue with a healthy stomach, or disease coexisting in both organs, but independent of each other.]

marks, "sometimes chiefly consists of bile; its colour at other times is too light, more frequently too dark, and occasionally almost black; at different times it assumes various hues, inclining to green or to blue; and sometimes it is mixed with, and now and then almost wholly consists of undigested bits of food." When there is much straining it often contains mucus, sometimes in distinct masses, or substances resembling bits of membrane. "It frequently separates from the canal with more difficulty than usual, and leaves a feeling of the bowels not having been completely emptied."

16. *b.* The *urine* of a person in good health is perfectly clear and limpid when passed, and continues so for some time after it cools, being more or less deep in colour, according as its ingredients are concentrated or diluted. But it has been satisfactorily shown that when acidity is prevalent in the stomach and digestive canal, or when the usual acid secretion of the skin is impeded or suppressed, the urine, after standing for some time, deposites a reddish substance, which is found to be a coating of lithic acid, the supernatant fluid still remaining clear; but when an opposite condition to this exists in the digestive organs, the contents of the stomach being alkaline or devoid of their proper acidity, and when the function of the skin is unusually excited, the urine becomes turbid, and a whitish, or purulent white sediment is observed, consisting of lithate of ammonia, or of an amorphous deposite of phosphates and lithates. If irritation or inflammatory affection of the stomach is present, this fluid is scanty and high-coloured. In irritability of the organ it is often pale, limpid, and very copious. In several states of indigestion, it occasions smarting in its passage, owing to the unusual abundance of urea. Dr. Prout observes that in one or two cases of obstinate dyspepsia he has seen the urine not only passed of a bright pink colour, but remain so on cooling, without depositing any sediment; and he considers this pink colour to proceed from the large quantity of purpurate of ammonia present, which, from there being no lithate of ammonia with which it might be combined, was necessarily held in solution.

17. *c. Pain and tenderness at the epigastrium* and region of the stomach have been much insisted upon by Dr. W. Philip as indicative of the more inflammatory states of dyspepsia; but, as I have shown elsewhere (see Stomach —*Morbid Sensibility of*), the most severe pains in this organ are often felt without any inflammatory disposition. Tenderness upon pressure is a very common symptom in the slight or more functional states of indigestion, as well as in the severe or more inflammatory, especially in thin and delicate persons. It is seldom wanting in irritative dyspepsia. The tenderness is often connected with *fulness* in this region, and also in the hypochondria; but this latter symptom is generally owing to the distention caused by flatus, and by feculent and flatulent collections in the colon. When emaciation takes place in protracted cases the fulness becomes more apparent.

18. *d.* The *pulse* in dyspepsia is extremely various, but it is most commonly as I have described it. During the digestion of a full meal it is usually accelerated, and somewhat harder or sharper than usual. The hardness insisted on by Dr. W. Philip as indicative of the passage of functional into inflammatory dyspepsia is seldom present. Sharpness and quickness are more frequently observed, and are symptoms of irritation rather than of inflammation. The febrile symptoms occasionally occurring, with soreness of the throat, high-coloured urine, and impaired secretions, are more probably occasioned by the former than by the latter pathological state.

19. *C. Of the states of the associated viscera in dyspepsia.*—It is obvious that indigestion will vary in form and severity, with the concomitance of disorder in any of the other digestive organs. The functions of the Duodenum may be deranged, as shown in that article; and, in this case, dyspepsia will present more or less of the characters there described (§ 2). Other parts of the digestive canal may be deranged, the affection consisting either in impairment of function, or in nervous or vascular irritation, and being limited to the small intestines, or to the large bowels, or even to one only of the latter. (See arts. Cœcum and Colon.) In such cases the physician will be guided by the state of the evacuations, and by the symptoms detected on a careful examination of the abdomen. It is not improbable that the pancreatic secretion becomes disordered, particularly in protracted cases; but of this sufficient proofs are seldom furnished: at best it can only be a probable inference. That this secretion may be diminished is not unlikely, inasmuch as there is sufficient evidence of the *biliary secretion* being deficient, retained, and altered, especially in the chronic states of indigestion; and it is reasonable to infer that, when one of the organs deriving influence from the same part of the nervous system is impaired in its functions, the other organs thus associated, as well as otherwise anatomically connected, will be similarly, if not co-ordinately affected. Indeed, every experienced practitioner must have noticed a more or less remarkable deficiency, or other disorder of the bile in dyspepsia; and not only of it, but also of the other secretions poured into the intestinal canal. That the disorder originally induced in the stomach often extends to the other digestive organs, owing to various concomitant or consecutive circumstances, cannot be doubted. It may be even apprehended that the consecutive disorder will become the most serious in its nature and consequences when these circumstances are frequent or continued in their operation, and that it will thereby obscure or mask the original affection. In many cases of dyspepsia the functions of the biliary apparatus are impaired, in respect not only of the quantity, but also of the qualities or properties of the secretion. In some, more or less of retention or obstruction of bile actually takes place, as shown by the state of the stools, rather than by the colour of the surface of the body. The remora of bile, also, in the biliary ducts and gall-bladder, arising from impaired function of the stomach and torpor of the liver, will farther increase the morbid state of the evacuations.

20. *D. Sympathetic affections of various organs.*—While an immense number of diseases originate in neglected or protracted indigestion, various disorders are entirely sympathetic of it.

Diseases of the urinary organs, of the liver and bowels, gout, rheumatism, various painful, neuralgic, and nervous affections, eruptions on the skin, disorders of the catamenia, and many others often thus arise. Dr. Webster, in a treatise published in 1793, endeavoured to show this, before the appearance of the writings of Mr. Abernethy on the subject; but it had not been altogether neglected in the works of Whytt and others. This excellent author very justly remarks that a delicate state of the first passages, or an unnatural sensibility of their nerves, not only disposes to many complaints in those parts, but the whole nervous system is thereby rendered more liable to be affected by the slightest causes. "Faintings, tremours, palpitations of the heart, convulsive motions, and great fearfulness, may be often owing more to the infirm state of the first passages than to any fault either in the brain or heart. The powers which the alimentary canal, when its nerves are disagreeably affected, must have in producing disorders in the most distant parts of the body, cannot be doubted by those who attend to that wonderful and widely-extended sympathy which obtains between it and almost the whole system."

21. *a.* The brain and organs of sense are often much affected by indigestion. *Headache* is one of the most common and severe affections sympathetically excited by this complaint, but it has received sufficient consideration in the article on its different forms. The manifestations of *mind*, both intellectual and moral, are also often more or less disordered, although but slightly or imperceptibly. Memory is somewhat impaired, attention is unsteady and cannot be long continued, the disposition is more fickle, and the temper more irritable than natural. There are often confusion of thought or of ideas, lowness of spirits, despondency, and vertigo, particularly in severe or protracted cases. M. Broussais has argued, with much apparent justice, that the functional disorder thus sympathetically induced in the brain may, by its frequency or continuance, pass into organic change, and several recent writers in this country have adopted the opinion.

22. *b.* The *organs of sense* are not less liable to sympathetic disorder. The *sight* becomes weak and indistinct, the eyes impatient of light or irritable, and specks, or muscæ volitantes, appear in the axis of vision. *Hearing* is frequently impaired, often from weakness of the nerves, but sometimes in consequence of the erythematic redness and inflammatory irritation symptomatically produced in the throat having extended along the Eustachian tube to the internal ear, or having caused obstruction of this canal. Noises in the ear are usually present in these cases; and these, as well as the hearing, depend much upon, and vary with the state of the stomach. Care should be taken, however, not to impute affections of the head and of the senses, depending upon disease within the cranium, to disorder of the digestive organs. The disorders of these parts, arising from the stomach and other digestive viscera, disappear, or are mitigated by wholesome food and drink, taken in moderate quantity; but when they proceed from the brain they are aggravated, or, at least, not mitigated by the usual ingesta.

23. *c.* In the article Flatulence, I have shown the effect produced upon the actions of the *heart* by this and other causes of distention of the digestive tube. Palpitations, and irregularity and intermissions of the pulse, very often proceed from dyspepsia, particularly when the functions of the liver and of the intestinal canal are also disordered. In such cases, the morbid sounds of the heart are usually wanting, unless in some cases of severe palpitation, when a slight bellows sound is heard. The functional disorder, when frequent or protracted, may be followed by dilatation or some other organic change. When structural lesion already exists in this organ, the symptoms are much increased by indigestion, and by concomitant disorder of the liver. It should, however, be recollected that lesions of the heart often occasion congestions of the liver and dyspeptic affections, and always aggravate them where they already exist.

24. *d.* The influence of dyspeptic complaints in producing *affections of the lungs* was contended for by Dr. W. Philip, doubted by Dr. Paris, but admitted, in a limited sense, by Dr. J. Johnson, and some others. The choice Dr. Philip made of the term "*dyspeptic phthisis*" was certainly not fortunate, inasmuch as its meaning is equivocal. In protracted dyspepsia, and particularly when the liver becomes congested, or otherwise disordered, the respiratory organs also are affected; the disorder of the digestive viscera both predisposing to affections of the respiratory passages, and occasionally more directly causing them. The irritation excited in the œsophagus, pharynx, and top of the larynx by the affection of the stomach is sometimes propagated along the air-passages; and if, at the same time, the stomach is frequently distended and the liver congested, so as to impede the circulation through the lungs, disease of this latter probably will often be induced, especially if latent tubercles, or some other states of predisposition, exist. Besides, the debility caused by protracted disorder of the digestive organs often calls latent tubercles into activity, or rapidly develops them; and it may even be suspected that the impaired nutrition, consequent upon the debility and protracted disorder of the organs of supply, will sometimes even give rise to tubercular productions where they did not previously exist even in a rudimental state.

25. iv. The Consequences and Terminations of Indigestion have been partially alluded to (§ 19, 20); but they require a more particular notice.—(*a*) Dyspepsia may terminate in a restoration of the healthy function of digestion; (*b*) It may pass into more severe functional or structural disease of the stomach; *c.* It may superinduce disease of the liver, bowels, and other collatitious organs; (*d*) It may give rise to affections of remote organs or parts; (*e*) and, lastly, it may alter the constitution of the circulating fluids, originate diseased secretions and depositions, and generate a morbid diathesis of the system, occasioning several serious constitutional maladies. These consequences will, however, depend much on the exciting causes, the predisposition, the temperament, the habit of body, and other circumstances proper to the person affected.

26. *a.* A termination in favour of healthy di-

gestion seldom takes place, or if it take place, it is rarely permanent, unless the predisposing and exciting causes are avoided. Many of those causes originate in those propensities, desires, and passions which are controlled with the greatest difficulty; and several of them depend upon habits which require the utmost force of character to relinquish. Hence the want of success so often experienced in the treatment of dyspeptic complaints, and the dissatisfaction evinced by those who run from one physician to another, unreasonably expecting immediate or permanent relief, still desiring to indulge the senses—to gratify the propensities and desires, natural or acquired, without paying the penalties thereby incurred. Hence, also, the frequency of the serious consequences of severe or neglected dyspepsia about to be noticed.

27. *b.* The forms of indigestion already described, from neglect or the continuance of their causes, may pass into the more severe affections of the stomach. In some instances, the most violent *gastrodynia* or gastralgia supervenes on them. (See Stomach—*Painful Affections of.*) In others, Pyrosis follows the form of irritative dyspepsia attended by the rejection of a glairy fluid (§ 13), and seems to be an extreme condition of the same complaint, with modifications depending upon peculiarities of constitution and of functional lesion. In some cases, Vomiting (see that article) of a severer or more prolonged character than that occasionally taking place in dyspepsia, occurs, even independently, although more frequently in consequence of structural change of either the stomach or some other organ. In the latter case, the source of mischief may be in the liver, or in the brain, or even in the kidneys, or uterus. More rarely, neglected cardialgia, or other dyspeptic states pass into partial or complete Rumination (see that article), particularly when the meals are taken hurriedly, in large quantity, and insufficiently masticated (see Author, in *Lond. Med. and Phys. Journ.* for May, 1821, p. 362). Neglected dyspepsia is very frequently followed by inflammatory action, and its consequences in the villous coat of the stomach (see Stomach—*Inflammation and Organic Lesion of*). This result, I am convinced, would more frequently take place, and when it did occur, would lead to still more serious effects but for the circumstance of the secretions from the villous coat favouring resolution by unloading the capillary vessels, and for the want of appetite and nausea attending inflammatory action, preventing the ingestion of substances calculated to keep up the morbid action.

28. *c.* The supervention of disease, functional or structural, in collatitious viscera, in the course even of the more simple and slight forms of indigestion, is so common, that the attention should never be withdrawn from it in practice. There are few cases of dyspepsia in which the functions of the Liver and Duodenum (see those articles) are not more or less disturbed. The *liver* becomes torpid and congested, and sometimes more or less tumid, from either congestion in its vessels, or accumulations of bile in the ducts; this secretion being often inspissated from absorption, during its remora, of its more watery part. It then either obstructs, irritates, or otherwise disorders the canals along which it passes (see art. Gall-bladder and Ducts), and affects even the substance of the liver itself, which ultimately becomes inflamed, and gradually and variously changed. In protracted or severe cases of indigestion, other organs also become disordered, especially the bowels; *constipation*, *colic*, or *diarrhœa*, in some one or other of their forms, frequently occurring, particularly when irritation of the digestive mucous surface is induced, and when the secretions poured into the intestines are deranged.

29. *d.* Affections of remote organs, sympathetically produced by dyspepsia, have been already noticed (§ 20), but there are others which arise from this complaint, rather by a succession of morbid changes than by any sympathy or consent of parts. When protracted or severe indigestion gives rise to an imperfectly elaborated chyle; or when the impaired organic nervous energy, which is chiefly manifested in the functions of the stomach in dyspepsia, extends also to the circulating, assimilating, and excreting organs, affections of the kidneys and urinary bladder, in connexion with a morbid state of the urinary secretion, frequently take place. Hence the formation of sabulous matter or gravel in the urine, and of calculi in the kidneys and bladder; and even the production of diabetes, and of slighter disorders of the excretion of urine. In females, dyspepsia not unfrequently occasions difficult, too frequent, or delayed or irregular menstruation, hysteria, and painful affections of the spinal nerves in some portions or other of their distribution, with tenderness in the dorsal spine. In both sexes, cutaneous eruptions either originate in, or are perpetuated by dyspeptic disorders, and by the state of the circulating fluids, and of the cutaneous exhalation consequent upon them. A due recognition and estimation of these connexions of disorder are of the utmost importance in practice.

30. *e.* There is every reason to infer that the pathological conditions, of which dyspepsia is an early and important indication, by altering the functions of assimilation and secretion, and weakening the processes of depuration, may give rise to a state of the circulation, productive of painful affections, or of unnatural formations and depositions in weak or predisposed parts; or, in other words, to a truly morbid diathesis, or constitutional derangement. Hence the frequency of rheumatism, of neuralgic or painful affections, of urinary calculi and gravel, and especially of gout, after protracted or severe indigestion.

31. II. Causes.—*A. Predisposing.*—Indigestion, although not confined to any period of life, occurs most commonly between the ages of twenty and forty-five; and in *its simple form* more frequently in the female than in the male sex. The upper classes of society and the middle ranks of life are most subject to this variety of the complaint. It is more prevalent in cold and temperate than in warm climates, and in the winter than in the summer; but, whatever may be the temperature of the climate or of the season, damp weather and a moist atmosphere may be regarded as among its most active predisposing causes. The predisposition to this disorder is sometimes hered-

itary, particularly in persons of a weak, relaxed fibre, with high nervous susceptibility, and general debility of constitution. Those in whom the functions of the stomach are naturally weak and feebly performed, the circulation languid, the temperature of the extremities below the natural standard, and the secretions generally disordered, or more abundant than usual, are also constitutionally predisposed to dyspepsia. Sedentary occupations, especially when carried on in close rooms and factories, indolent habits either of body or mind, long and intense study, insufficient exercise in the open air, addiction to debilitating excesses and injurious indulgences, luxurious modes of living, indulgence in sleep or in bed, breathing impure air, and confinement to close or ill-ventilated apartments, remarkably predispose to this complaint. In persons thus predisposed, the slightest excess or irregularity, or the most trivial exciting cause, is often sufficient to bring on an attack of indigestion; while a repetition of such causes, or long exposure to their action, in those of a stronger habit and more vigorous constitution, cannot fail to have a similar effect.

32. *B. The exciting causes* are divisible into two classes: (*a*) Those which operate immediately or directly upon the stomach itself; and, (*b*) Those which influence this organ through the medium of other parts.—(*a*) The causes which affect the stomach itself act either by diminishing or otherwise vitiating its secretions, so that the due change is no longer effected in the food; or by debilitating its muscular power, so that the aliment, although it may have been properly acted upon by the gastric juice, is not propelled into the duodenum with the natural ease and rapidity. As the admixture of the food with the gastric juice, and the passage of the chyme into the duodenum can only be accomplished by the due contraction of the muscular fibres of the stomach, it is evident that whatever tends to weaken or to impede this action, will at once be followed by oppression or distention of the organ. In this class of agents may be included narcotics, taken habitually or in excess, as opium, henbane, conium, digitalis, &c., indulgence in ardent spirits or intoxicating liquors, and the constant or frequent use of the preparations of ammonia, of lavender, and of other aromatic spirits. But the most common causes of indigestion are, irregularity and want of due caution in diet, whether as regards the quantity or the quality and congruity of the food, or the periods at which it is taken, and the use of tobacco in any of the modes in which this noxious substance is so generally employed.

33. A want of due relation between the state and powers of the digestive organs and the substances upon which they are required to exercise their functions, is a very frequent cause of this complaint; for whether the stomach be distended by an unusual quantity of food, or whether its secretion be compelled to act upon substances which are inappropriate or to which it is unaccustomed, the function of the organ will be equally impeded; and if the exciting cause be powerful, or continue in operation, digestion will be altogether suspended. Hard and indigestible articles of food must therefore be productive of this disorder, and hence its frequency among the peasantry and lower orders. Heating and highly seasoned articles of food, hot dishes, and condiments, mushrooms, shell-fish, melons, cucumbers, nuts, and similar substances; raw, stale, or unripe fruit; rich articles of confectionery; acid, iced, or sweet fluids, especially when taken during the process of digestion; large quantities of cold or of warm fluids, as of tea, relaxing slops, &c., and the habitual use of malt liquor, are among the most common causes of indigestion. The kind of aliment also exerts no small influence, even in mechanically distending, and thereby weakening the stomach; for as most of the articles of food, when received into the organ, seem to swell in a greater or less degree, a bulky meal, particularly of solid or pultaceous or vegetable substances, will not a little contribute to this effect. To the above causes may be added, irregularity in the period between the times of taking food, hasty or imperfect mastication, frequent interruption or talking during the progress of eating, the omission of an accustomed meal, abstinence or long fasting—hence its frequent occurrence during the fasts of the Catholic Church, and among the Brahmins, Fakirs, &c., in India—a sudden change in diet from animal to vegetable food, and from substances of a succulent and refreshing to those of a dry and heating nature, and severe and repeated vomiting. All these tend, in a greater or less degree, to debilitate the muscular fibres of the stomach; to produce a deficiency of gastric secretion, or a secretion vitiated in its properties, and to irritate the villous coat of the organ.

34. *b.* Among those causes which operate on the stomach through the medium of other parts may be classed those mental emotions which depress nervous power or otherwise disorder its manifestations. A due secretion of the gastric fluid depends much on the state of nervous influence, for a deficiency of the latter impedes or lessons the former. Any sudden intelligence, a violent fit of passion, or of great joy, sometimes instantly brings on an attack of indigestion. Grief, anxiety, envy, jealousy, indulgence in tender feelings, repeated disappointment, reverses of fortune, night watching, &c., more slowly, but more certainly exert a similar influence. Whatever exhausts the body and lowers the constitutional powers, exerts a correlative effect on the digestive functions, as venæsections improperly adopted, or soon after a meal; protracted hæmorrhages, menorrhagia, leucorrhea, venereal excesses, seminal weakness, and exhausting discharges of any kind. In persons particularly of a weak and delicate constitution, indigestion is easily induced by change of weather, by exposure to the night air, or to cold and humidity, by cold extremities, by a low temperature when the body is quiescent, as when travelling in an open carriage or on the outside of stages, by a fatiguing journey, by damp residences, and similar circumstances. Whatever exerts a depressing effect on the organic nervous power, or on any of the internal viscera, will also lower the function of the stomach, as large doses of calomel, or too long a continuance of this medicine, irritating and drastic purgatives, &c. Dyspepsia may be brought on also by the suppression of the natural and the accustomed discharges, or by the retropulsion of cutaneous

eruptions, &c. It also not unfrequently accompanies catarrhs, rheumatism, and diseases of the thoracic viscera; it is a necessary consequence of disorder of any other of the abdominal organs, and it precedes and attends the various states of gout, &c.

35. *C. The irritative states of dyspepsia* are more frequently met with in the male than in the female sex, and are very prevalent in the southern countries of Europe, and among Europeans resident in tropical regions. They are common in those warm climates in which the air is dry, and the temperature subject to frequent and sudden variations; but the causes acting directly on the stomach are often frequent and influential in those countries. In warm climates, the modes of living—the diet and regimen of Europeans—are extremely prejudicial to the digestive functions, as shown by Mr Annesley and the author. — (*Researches on the Diseases of India and of Warm Climates generally*, &c., 4to, vol. i., p. 226.) The quantity and nature of the food and drink usually taken excite and irritate the stomach, liver, and intestinal canal, and exhaust their functions; the states of indigestion thus induced soon passing into inflammation, or into organic changes, if neglected or injudiciously treated.

36. The irritative states of dyspepsia are, however, by no means uncommon in this country in hot seasons, and even in very cold weather, and during the prevalence of severe or long-continued frosts, accompanied by northeasterly winds. They affect persons of a sanguine and bilious temperament, and of plethoric habit; and in them, especially, are sometimes produced by checked perspiration, by the suppression of accustomed discharges, as of hæmorrhoids, of leucorrhea, of the catamenia, &c., by the drying up of ulcers, and by the repulsion of cutaneous eruptions. They are, however, more commonly occasioned by the abuse of stimulants, as highly seasoned and rich food, and by addiction to spirituous and intoxicating liquors, and to opium. These states of indigestion are not so often consequent upon errors in diet as the other forms of the complaint; but they are most frequently met with in the habitual drunkard. They may be induced by change of diet, or change of residence or climate, and hence their great prevalence during spring and autumn; by stimulating medicines, as a long continuance of the use of cubebs and copaiba for gonorrhea; by drastic and irritating purgatives; by powerful or repeated emetics; by tonic, stomachic, and aromatic spirits or tinctures, taken in large doses or on improper occasions; by hot spices and pickles, particularly Cayenne pepper, capsicums, &c.; by the frequent use of mercurial and of heating medicines; by drinking cold and acid fluids after violent exercise, or while the body is perspiring, and by various noxious articles, used either as food or drink, or which give rise to incongruous mixtures in the stomach.

[Dyspepsia is, comparatively, a very modern disease in our country, having been scarcely known until within the last thirty years. Our ancestors, as stated by an accurate observer,* were accustomed to much bodily exertion; there were but few pleasure or wheel carriages in the country; both males and females generally rode on horseback; professional men almost universally had farms, on which they laboured more or less; mechanics were also frequently engaged in agricultural pursuits; the habits of living were simple and frugal; intoxicating drinks were seldom drank; religious excitements, so destructive to the health both of body and mind, were almost unknown; regular and natural hours of sleeping and eating were observed; and these circumstances proved highly propitious in securing the general enjoyment of bodily health and mental vigour. These salutary habits, however, have been gradually exchanged for those of a more unnatural and injurious tendency: bodily labour, carried to the point of fatigue, is now deemed degrading, if not decidedly vulgar; languishing in easy carriages has succeeded to pedestrian habits and equitation; professional men confine themselves to the legitimate business of their calling; excitements of every kind, civil, religious, political, mesmeric, are the order of the day; habits of luxurious living have become general; alcoholic drinks are more extensively used than formerly, although a great improvement has taken place in this respect within the last few years; the almost universal practice prevails of using tobacco in some form; habits of inactivity, tight lacing, keeping late hours, &c., are gradually undermining the health of the female sex, and laying the foundation of gastric affections; and all these causes, with numerous others that might be named, are slowly deteriorating the health of the community, and their effects are likely to become still more evident and distressing in the next and succeeding generations.

Some of these causes of indigestion deserve more particular consideration. With respect to the use of tobacco, which has been lately increasing to an alarming extent, there can be no doubt that it is one of the most frequent causes of dyspepsia, notwithstanding the opinion sometimes advanced of its comparative harmlessness. Dr. Chapman states that a large proportion of the cases of this disease that come under his observation are produced by this drug.—(*Lectures on the more important Diseases of the Thoracic and Abdominal Viscera. Philad.*, 1844.)

Dr. C. refers to several striking cases to illustrate the injurious effects of this habit. In one instance, a member of Congress, of athletic frame, complained of labouring under the greatest physical and moral infirmity, and, although formerly healthy and fearless, had become so nervous and timid that he was unable to present a petition to Congress, or to say a word in its behalf, although he had long been a practising lawyer and served much in legislative bodies. He was, moreover, tremulous and frightened at any sudden noise; his appetite and digestion were gone; he had painful sensations at the pit of the stomach, and laboured under constant constipation of the bowels; his countenance was wild and ghastly, and, altogether, his condition most deplorable. On inquiry, it was ascertained that he used tobacco most enormously, both by chewing, snuffing, and smoking. By discontinuing the use of this

* "A Dissertation on Chronic Debility of the Stomach, by Benjamin Wolsey Dwight, in Memoirs of the Connecticut Academy of Arts and Sciences, vol. i., part ii. New-Haven, 1811."

poisonous weed, he entirely recovered within a few weeks. Dr. C. relates other cases equally striking where symptoms of *delirium tremens*, with total derangement of the digestive function and the nervous system, were consequent on the use of this article. We could relate numerous instances as strongly marked of the pernicious consequences resulting from tobacco, which have fallen under our own observation, but it is unnecessary.

Another very prominent cause of the prevalence of indigestion in this country is the excessive use of cathartic medicine in the form of pills. Were we to give the amount of the latter annually swallowed in the United States, the statement would not be believed; and yet we have it from good authority, namely, that of the manufacturer himself, that one establishment in this city turns out, by the aid of steam, no less than ten barrels per day; and this is by no means so extensive as some others of a similar kind. These pills, which are highly drastic, are used by immense numbers of people, not only in cases of actual illness, but in time of health, as prophylactic remedies: the consequences are easily predicted. In addition to this, great quantities of bitters are used, in which brandy, wine, or some alcoholic liquor forms the principal ingredient, and on the occurrence of the least feeling of discomfort, recourse is had to the panacea, till at length the powers of the stomach are exhausted, and derangements, either functional or structural, take place. We could wish that the epitaph of the Italian count could be placarded so as to be seen by every man, woman, and child: "*I was well, wished to be better, took physic, and died.*" Much of this evil is doubtless owing to physicians, who have been too much in the habit of pouring down drugs empirically in every case of illness, slight or severe, in order to humour a popular notion that the materia medica must furnish a remedy for every disease, and a popular prejudice, that want of success is a sure indication of poverty of resource on the part of the practitioner.

Another very frequent cause of indigestion among us is the hurried manner of taking meals, to say nothing of the great variety and incongruous nature of the articles eaten. Americans have the reputation, whether deserved or not, of devoting less time to the pleasures of the table than the people of any other nation. We believe the remark to be, to a great extent, well founded; if so, it must be a frequent cause of indigestion, and of the evils that follow in its train. Healthy digestion is only compatible with perfect mastication and insalivation, which are impracticable where there is much haste in eating. Moreover, as a people, we eat far too much hearty food, the consequence of which is that the system becomes overloaded and oppressed; the various organs are clogged in the performance of their several functions; the circulating fluids become too thick and stimulating, and the predisposition to derangements and diseased action greatly increased. Hence arise not only frequent gastric disturbances, but a large proportion of our inflammatory and febrile diseases; and hence it is that our acute diseases so generally require blood-letting and other active treatment; and hence the danger of trusting to *medicine expectante*, or homœopathy, which is another name for the same thing.

Among students and literary men, including a large proportion of the clergy, intense application, with neglect of bodily exercise and a too stimulant diet, are very influential in bringing on this affection. To these may be added the perturbating or depressing passions; the anxieties and cares incident to our modes and habits of living and doing business; dress too thin, or inappropriate to the season; the cultivation of the fancy and imagination at the expense of the other mental faculties; our variable climate; the abuse of mercurials; the growing habit of opium-eating: all these causes appear to be operating with unrelenting force on each succeeding generation, and, unless speedily arrested, would seem to threaten the serious deterioration of the race.

The physiology of digestion will be considered under the article "Stomach." It is important to bear in mind that the conditions of healthy digestion are, that the food should be thoroughly masticated, mixed with saliva, and taken into the stomach; that it should there be reduced to a semi-fluid consistence, and converted into a uniform pulp called chyme; that the chyme should be transmitted through the pylorus into the duodenum, and there mixed with the bile, the pancreatic secretion, and the intestinal mucus, and that the chyle, or nutritive portion of the food, should be taken up and carried into the blood. The agent by which the food is dissolved and transformed in the stomach is the *gastric juice*, a secretion peculiar to this organ, which is only secreted while food is present in it, and which owes its solvent power to a special principle, which chemists have named *pepsin*.]

37. III. Pathology.—Indigestion manifestly proceeds from the following *conditions* of the stomach and related organs, either of which may be somewhat more prominent than the rest: 1. Impaired organic nervous power of the stomach. 2. A deficient or disordered state of the gastric juice, or a want of a due relation between the quantity and nature of this fluid and the ingesta. 3. Impaired absorbing power of the stomach, rendering the digestion of the fluid ingesta more or less difficult, and weakening the gastric fluid. 4. Diminished muscular energy of the stomach; the motions and tonic vermicular actions of the organ being weakened, and the admixture of the gastric juice with the ingesta being thereby impeded or delayed.* These pathological conditions may

* As Dr. Combe observes, the *first* requisite to digestion is an adequate supply of gastric juice, and its thorough admixture with every particle of the food on which it is to operate. The *second* is a steady temperature of about 96° or 100° Fahr. The *third* is the gentle and continued agitation of the alimentary mass in the stomach during the digestive process. Much light has been thrown upon the function of digestion, and, consequently, upon disorders of this function, by the experiments of Dr. Beaumont, of America, on St. Martin, a strong young Canadian, who was wounded in the left side, a fistulous opening into the stomach remaining without detriment to the general health. For some months after the wound the food could be retained only by wearing a compress and bandage; but early in winter a small fold or doubling of the villous coat began to appear, which gradually increased till it filled the aperture and acted as a *valve*, so as completely to prevent any efflux from within, but to admit of being easily pushed back by the finger from without.

Dr. Beaumont describes the aperture in St. Martin's stomach as being situated about three inches to the left of

be *primary*, or they may be *consecutive* upon disease of the brain, of the liver, of the intestines, of the heart, of the kidneys, or of any other organ; or they may be part only of some more general malady. Dyspepsia may thus be *idiopathic* or *symptomatic*. As presented to the physician in practice, indigestion is generally owing to the above conditions, in connexion with the following: 1. Deficiency as to quality and quantity of the fluids derived from the liver, pancreas, and intestinal mucous membrane. 2. Disorder of the circulation and functions of this membrane; and, 3. Disorder of the consecutive and harmonious actions of the muscular coat of the small and large intestines.

---

the cardia, near the left or superior termination of the great curvature. When the stomach was nearly empty, he was able to examine its cavity, to the depth of five or six inches, by artificial distention. When it was entirely empty, the stomach was always contracted on itself, and the valve generally forced through the orifice, together with a portion of the mucous membrane, equal in bulk to a hen's egg. After sleeping for a few hours on the left side, the protruded portion became so much larger as to spread over the neighbouring integuments five or six inches in circumference, fairly exhibiting the natural rugæ, villous membrane, and mucous coat lining the gastric cavity. This appearance was almost invariably exhibited in the morning before rising in bed.

The first point which Dr. Beaumont conclusively settled is, that the gastric juice does not continue to be secreted between the intervals of digestion, and does not accumulate to be ready for acting upon the next meal. The next which he established is, that in health the gastric secretion always bears a direct relation to the quantity of aliment naturally required by the system, so that if more than this be taken, there will be too small a supply of the juice for the digestion of the whole. Dr. Beaumont farther ascertained that the gastric secretion and the villous coat undergo great changes during disease. In the course of his attendance on St. Martin, he had opportunities of *seeing* what was actually going on in the organ, and of observing that whenever a feverish state was induced by obstructed perspiration, or by stimulating liquors, or by overloading the stomach, and that when influenced by fear, anger, or other emotions depressing or disturbing the nervous system, the villous coat became sometimes red and dry, and at others pale and moist, having lost its smooth and healthy appearance. As a necessary consequence, the secretions became vitiated, impaired, or suppressed; and the follicles, secreting the mucus which protects the surface of the villous coat, became flaccid, and no longer yielded this bland secretion. The nervous and vascular papillæ thus deprived of their defensive shield, were then subjected to undue irritation. When these diseased appearances were considerable, the system sympathized, and dryness of the mouth, thirst, quickened pulse, &c., showed themselves; and no gastric juice could be procured or extracted, even on the application of the usual stimulus of food. The dry, irritated appearance of the villous coat, and the absence of the healthy gastric secretion in the febrile state, as Dr. Combe has remarked, not only explain at once the want of appetite, nausea, and uneasiness generally felt in the region of the stomach, but also show the folly of attempting to sustain strength by forcing the patient to eat when the food cannot be digested, and when nature instinctively refuses to receive it.

The inferences, drawn from the experiments and observations of Dr. Beaumont and others, that more immediately concern the subject under consideration, may be stated as follows:

1. That the processes of *mastication*, *insalivation*, and *deglutition* are important, not merely as subjecting the food to the gastric juice in a state of due preparation for its action, but also as allowing time for the regular contraction of the stomach upon each individual morsel conveyed into it, as well as transmitting the food in small portions at a time, so as to prevent a too rapid or excessive and injurious distention of the organ.

2. That the gastric juice is the agent of chymification; that it is secreted from vessels distinct from the mucous follicles; that it is a clear, transparent fluid, without odour, a little salt, and perceptibly acid; and that it contains free hydrochloric acid, a little acetic acid, and some other active chemical principles.

3. That this juice is never found free in the stomach, but is always excited to discharge itself by food or other irritants; that it is seldom obtained pure, but generally mixed with mucus, and sometimes with saliva; and that, when pure, it is capable of being kept for months, or even years.

4. That it is a solvent of food, and alters its properties; that it checks the progress of putrefaction, corrects putrid substances, coagulates albumen and milk, and afterward dissolves the coagula; and that it commences its action on food as soon as it comes in contact with it.

5. That it is capable of combining with a certain fixed *quantity* of food, and when more is presented for its action than it will dissolve indigestion will ensue; and that its action is facilitated by the warmth and motions of the stomach, these motions taking place chiefly in two directions, transversely and longitudinally.

6. That the gastric juice is modified in quantity, and probably in its intimate constitution, so as to suit the kind of food; and hence the occurrence of indigestion on sudden alterations of the kinds, quality, and quantity of food.

7. That the action of the stomach and of its fluids is the same on all kinds of diet; and that the motions of the stomach produce a constant admixture of food and gastric juice, and thereby facilitate digestion.

8. That *solid* food, of a certain texture, is easier of digestion than *fluid*; that *animal* and *farinaceous* aliments are more digestible than *vegetable*; but that susceptibility of digestion does not depend altogether upon natural or chemical distinctions.

9. That digestion is facilitated by *minuteness of division* and *tenderness of fibre*, and retarded by opposite qualities.

10. That the ultimate principles of aliment are always the same, from whatever food they may be obtained.

11. That chyme is homogeneous, but variable in its colour and consistence; and that, towards the latter stages of chymification, it becomes more acid and stimulating, and passes more rapidly from the stomach.

12. That soups and other liquid food do not call into play the muscular coat of the stomach; and before the gastric juice can act upon them the fluid part must be absorbed, and the mass thickened to a proper consistence for undergoing the usual churning motion; and, consequently, that this kind of food often gives rise to acidity, particularly in weak states of the stomach.

13. That, owing to the adaptation of the gastric juice to the nature of the food, sudden or extreme changes from one kind of diet to another is injurious; for the stomach has not had time to modify its secretions sufficiently to meet the altered demand upon its powers.

14. That water, ardent spirits, and most other fluids, are not affected by the gastric juice, but pass from the stomach soon after they have been received; that heating condiments are injurious to the healthy stomach; and that the use of spirits always causes disease of this organ if persevered in.

15. That bulk as well as nutriment is necessary to articles of diet; and that digestibility does not depend upon the quantity of nutrient principles that aliments contain.

16. That the quantity of food generally taken is more than the wants of the system require; and that such excess, if persevered in, generally produces functional disorder, and, consecutively, organic disease.

17. That oily food is difficult of digestion, though it contains a large proportion of nutrient principles.

18. That *bile* is not usually found in the stomach, and is not necessary for the digestion of food; but that, when oily food is used, it assists digestion.

19. That gentle exercise facilitates digestion; and that the *acetic*, *citric*, and *hydrochloric* acids promote this process, particularly if vegetables and indigestible substances have been taken.

20. That the time required for the stomachic digestion depends upon the quantity and kind of food, and upon the state of the stomach; that the time required for the disposal of a moderate meal, in a healthy state of the organ, varies from three hours to three hours and a half or four hours; and that in states of indigestion the process is delayed much longer than this, particularly as respects the more indigestible substances.

21. That a diminution of the temperature of the stomach below 98° impedes digestion; and that the temperature of the organ is not necessarily elevated by the process.

22. That whatever promotes organic nervous power without exhausting it favours digestion, as breathing a dry, pure air, hilarity of mind, moderate laughter, &c.

23. That the organic or ganglial nervous influence is more concerned in the process of digestion than the influence conveyed to the stomach by the eighth pair of nerves; and that the circulating, absorbing, and especially the secreting functions of the organ, are under the dominion of the former, while the sensibility and muscular contractions are directed by the latter.

24. That the inferences drawn by Dr. W. Philip from his experiments as to digestion depending upon the influence of the eighth pair of nerves, and as to galvanism being capable of supplying the place of this influence, are unphilosophical, as they are formed without due consideration of all the circumstances, and as they leave out of the account the shock given to the system by the violent operations performed in these experiments.

[Every close observer of disease must acknowledge that dyspepsia is symptomatic of two opposite conditions of the stomach: one of congestion, or inflammatory irritation; the other of anæmia, or, rather, of deranged nervous sensibility. The latter form of indigestion, consisting in a purely morbid state of the sensibility of the gastric nerves, has been well described by Dr. JAMES JOHNSON, in his work on the Morbid Sensibility of the Stomach and Bowels, to which the reader is referred. Now it is obvious that, for the successful treatment of this disease, we should be able to determine with some certainty whether the symptoms are dependant on nervous or vascular irritation—whether the gastric mucous membrane be in a state of active congestion, or the nervous sensibility of the organ only be deranged. By attending to the following directions, chiefly from JOLLY, we shall be materially aided in arriving at a correct diagnosis. In a purely nervous affection of the stomach we have pain of an acute, tearing, intermittent kind, diminished by pressure, and by taking food; more frequently occurring in the morning. In inflammatory affections of the stomach we have pain of a dull, obscure, constant kind, augmented by pressure and by food, increasing towards the evening. In the former (the nervous) we have the tongue sometimes coated, broad, and clean; in the latter, almost always red, contracted, thickly coated. In the former the appetite is morbidly increased, depraved, and there is a craving for high-seasoned dishes and alcoholic drinks; in the latter the appetite is wanting, never depraved, and there is an aversion to high-seasoned food and alcoholic stimulants. In nervous affections of the stomach the taste is metallic, or acid, and there is a vomiting of mucous secretions; in the inflammatory affections the taste is bitter or clammy, and the food is rejected. In the former the thirst is not increased, and there is a desire for warm or cold drinks indiscriminately; in the latter there is morbid thirst, and a constant wish for cold drinks. In the former there is frequent constipation, while the stools are often natural, and not offensive; in the latter there is frequent diarrhœa, with bilious, mucous, bloody, or offensive stools. In the former there is frequently pulsation in epigastrio, intermittent, and not synchronous with those of the heart; in the latter the pulsations in the epigastrium are natural, continuous, and synchronous with the cardiac pulsations. In the former there is either no fever, or it is of an intermittent kind; in the latter there is fever, which is continuous. In the former there is an increase of the disease early in the day, the urine is clear and abundant, and the heat of skin natural; in the latter there is apt to be an exacerbation in the evening, the urine is high-coloured and scanty, and the temperature of the surface is augmented. In the former there is no progressive emaciation, the physiognomy is natural, the temper morose, melancholy, or irritable; in the latter there is a gradual wasting of flesh, the features are pale, sallow, sunken, or anxious, and the disposition but little altered. In the former the diagnosis is often obscure, the prognosis less dangerous, and the anatomical characters equivocal or altogether wanting; in the latter the diagnosis is usually more clear, the prognosis more unfavourable, and the anatomical characters constant, but more or less varied. Occasionally, however, the symptoms of vascular and nervous irritation of the stomach are so similar that the most experienced practitioner is at a loss to decide upon their precise pathological character, and we are guided in our diagnosis chiefly by the results of treatment. And there can be no doubt, moreover, that cases of a complicated character often occur in which there is a blending of the symptoms above detailed, indicating a union of gastritis with exalted gastric sensibility.]

38. IV. TREATMENT.—There are few diseases which require greater attention to its causes and to its various states during treatment than this. The *objects* of the practitioner are, 1. To ascertain the predisposing and exciting causes; 2. To draw a rational inference as to the pathological states on which the complaint depends; and, 3. To examine into its associations, and to attend to the nature and relations of its complications, whether primary or consecutive. Guided by these *general intentions*, the more *special indications* are, 1. To avoid the causes; 2. To give immediate relief to the more urgent symptoms, as acidity, cardialgia, flatulence, pain, costiveness, &c.; 3. To remove the pathological states and their consequences; and, 4. To prevent a return of the disorder. These indications require to be fulfilled by means appropriate to the particular form of the complaint.

39. i. *Treatment of the Asthenic Form of Dyspepsia.—A. In the more acute states*, it is sometimes necessary to remove the load by which the stomach is oppressed, or the substance by which it is irritated, by an *emetic*. But, unless when it is obvious that the disorder depends upon this cause, emetics are injurious, particularly a repetition of them. In such circumstances, the effect is soon produced by irritating the fauces by a feather, or with the finger; by a warm infusion of chamomile flowers; by tepid water, with common salt, or with an aperient salt, and by ipecacuanha. When pallor of the countenance, nausea, oppression, and the sense of a load at the epigastrium, and rancid or bitter eructations are present, emetics are indicated; and these are the most suitable means. But after the organ is evacuated, its functions should be restored by repose, and by small quantities of Seltzer water, of iced water, or a cooling aromatic water, as spearmint, &c. Food should not be given till the appetite returns, when the lighter and more palatable articles may be taken. The bowels afterward require to be evacuated, either by stomachic aperients, as rhubarb, with magnesia or soda, in an aromatic water, or aloes with an alkali, as in the compound decoction, or by enemata. Most of the means recommended in the article CONSTIPATION (§ 15, *et seq.*), and in several of the Formulæ of the *Appendix*, will likewise be appropriate in these circumstances.

40. When *nausea* continues after the stomach and bowels have been evacuated, or when the *vomiting* is protracted after offending matters are removed, medicines to relieve these symptoms should be prescribed, especially the *hydrocyanic acid*, in camphor julep, with a little compound spirit of lavender, or tincture of cardamoms, or a drop or two of *creasote*, in the form of a pill, with powdered liquorice root.

Effervescing draughts, with citric acid and ammonia, this last being somewhat in excess; or the liquor ammoniæ acetatis, with camphor mixture, or with spearmint water; or calcined magnesia, in this or in any other aromatic water, will also be serviceable. If these fail of affording relief, active purgative enemata will generally be efficacious, the symptoms disappearing as soon as a free action of the bowels is procured.

41. *Heartburn* is best treated by medicines which act upon the secretions and move the bowels. Rhubarb, with magnesia, and sesquicarbonate of ammonia, in an aromatic water; a blue pill, with Castile soap; and alkaline solutions in bitter tonic infusions, or in lime-water, are commonly employed, and are most useful when this symptom is connected with acidity. But when heartburn is attended by rancid, septic, or insipid eructations, the mineral acids, as the nitric, the hydrochloric, and the aromatic sulphuric acids, given in simple camphor, or aromatic water, or in suitable tonic infusions, will be most serviceable. Dr. PEMBERTON advises lemon juice in these cases, and Dr. TODD the phosphoric acid. When there is a liability to heartburn, wine, spirits, and particularly malt liquors, should be avoided. Hock or old sherry may, however, be taken in great moderation in Seltzer water.

[*Ipecacuanha*, in small doses, often proves a very efficacious remedy for heartburn; and the following pill may be taken three times a day with decided benefit: ℞ Pulv. Ipecac., gr. xii.; Pulv. Rhei, Sapon., āā, 3ss. M. Ft. mass. in pill. xviii. divide; where nausea is present, a small quantity of aromatic powder, ammonia, or quinine, will often afford relief. The latter, combined with ipecacuanha, forms a very efficacious remedy, as does also the ipecacuanha and ammonia. The *sulphuret of potassa* and the natural *sulphur waters* have formerly enjoyed a high reputation in the treatment of this affection. The former may be advantageously combined with the extract of gentian or hop, or with rhubarb or aloes. Dr. DICK (*On the Digestive Organs*, p. 128, Phil. edit.) recommends *gunpowder* in cases of heartburn with eructations, as tending to relieve the morbid sensations, correct the secretions, preserve the bowels in a soluble state, and to exercise a very favourable action upon the skin, kidneys, and lungs.]

42. *Pain*, or the slighter states of morbid sensibility, will be best removed by the *trisnitrate of bismuth*, conjoined with extract of *hop*, or extract of *hyoscyamus*; by *hydrocyanic acid* or *creasote*, as directed above* (◊ 40); by other anodynes, given with aromatics and antispasmodics; by the compound or fœtid spirit of ammonia, in suitable vehicles; by the compound galbanum pill, or the compound rhubarb pill, with henbane and ipecacuanha; by draughts of warm water, either alone, or with an alkali, or with magnesia. If pain be severe, and if *vomiting* have come on spontaneously, and continued after morbid matters are removed, a full dose of *opium*, with an aromatic, or of the acetate or hydrochlorate of morphia, similarly combined, should be prescribed. But the propriety and frequency of repeating it will depend upon the circumstances of the case. If *flatulence* is troublesome, the means already advised may be prescribed, or those recommended in that article (◊ 15) may be employed. Friction over the epigastrium, especially with a stimulating liniment, will also give immediate relief from both pain and flatulence. When *headache* is present, the treatment proposed for *Dyspeptic* HEADACHE (◊ 46) should be directed. For the *costiveness* so generally attendant upon this form of indigestion, the medicines already noticed, or those about to be prescribed, or a combination of mild aperients with tonics, deobstruents and alteratives being given occasionally at night, will prove of great service.

[Some writers have recommended the *oil of turpentine* in this form of dyspepsia, when of long duration, and the patient is exhausted by its violence, in doses of a drachm every hour or two, mixed with mucilage. We have known it employed with much benefit under such circumstances, as we have also the *arsenical solution* (FOWLER'S) and the *nitrate of silver*, in doses of a sixth of a grain, gradually increased to three or four grains, three times a day, in the form of pills. We consider it important, to ensure the full effects of this remedy, that no chloride of soda or common salt should be taken either immediately before or after taking the pills. Where gastrodynia assumes a periodical character, a *watery infusion of bark*, or even quinine, will often afford relief, but *alcoholic tinctures* should be entirely proscribed. Besides the danger of creating an appetite for stimulants of this kind, they almost invariably exasperate the disease, although they often afford temporary relief.

In these cases, attended with cardialgia owing to acidity, the following formula is recommended by Dr. CHAPMAN: ℞ Carbonat. Sodæ, vel. Carb. Potass., 3ii.; Gum Arabic, 3ij.; Sp. Lavend. Comp., 3i.; Tinct. Theb., gtt. xx.; Aq. font., 3iv. M. Where the stomach has lost its tone, as in the case of drunkards, the following preparation will succeed better than any other: ℞ Aq. Ammo. pur., 3j.; Magnes. Calcin., 3ij.; Aquæ Cinnam., 3ij.; Aq. font., 3vj. M. Where much muriatic acid already exists in the stomach, ammonia is supposed to be objectionable, from its liability to form a muriate of ammonia, which would prove a source of irritation. Under these circumstances, the ensuing mixture will answer: ℞ Liquor Potassæ pur., 3j.; Magnes. Calc., 3ij.; Aq. Cinnamom., 3ij.; Aq. font., 3vj. The dose of this and the preceding mixtures is about 3ss., repeated *pro re nata*.]

43. After an acute attack of dyspepsia, particularly when occasioned by errors of diet, it is necessary to enjoin abstinence, and thus afford the stomach time for repose, until its or-

* [The *hydrocyanic acid* is an admirable remedy in this form of dyspepsia, attended with pain and cardialgia, and prepares the stomach for the reception of tonics and other remedies which otherwise would be inadmissible. It has been used to a considerable extent in this country by some practitioners; but the difficulty of preserving it of a suitable and uniform strength, the danger from differences in formulæ, and its alleged uncertainty, have all tended to prevent its general introduction into practice. But these drawbacks may be guarded against by using that prepared according to the last United States Pharmacopœia (1842), which contains 2 per cent. of pure anhydrous acid, and keeping it carefully protected from the light. For the relief of gastralgia, even when complicated with gastritis, we know no remedy comparable with it; and between the periods of its administration we may give the carbonate of iron, or quinine with ipecacuanha, or strychnine (which is an admirable remedy in many cases of dyspepsia), with the best effect.]

ganic sensibility and functions begin to return. After a while, a cupful of mutton or veal broth, or of green tea, or of coffee without milk, may be given and repeated; or a wine-glassful of Port-wine negus may, in some cases, be allowed. But care should be taken in returning to a full diet; and the injunctions as to diet about to be stated ought to receive attention. In general, tonics and stomachics should not be prescribed until the functions of the stomach are returning.

44. *B.* Having removed the more acute attack of asthenic dyspepsia, with its urgent symptoms, the remaining disorder is in all respects the same as the more *slight and chronic states of the complaint*, and requires a similar treatment to them. The *third intention* of cure (§ 38) should now be carried into effect; and the organic nervous energy, the secretions, and the muscular tone of the stomach be improved. This intention is to be effected chiefly by the *diet* and *regimen* hereafter to be noticed; but a judicious recourse to medicine will also prove of great benefit. The infusion of cinchona, of columba, of gentian, chamomile, cusparia, cascarilla, will be severally useful, with the alkaline carbonates, and small doses of stomachic tinctures. Afterward the metallic tonics, as the tincture of the sesquichloride of iron, the sulphate of iron, the sulphate of zinc, the trisnitrate of bismuth, and the mineral acids, will generally be of service. Several of these may be given with the extract or tincture of hop, or of hyoscyamus. Lime-water may be taken with aromatics, particularly when the bowels are much relaxed; and the aerated or alkaline chalybeate waters may be used. When there is no complication contra-indicating cold bathing or the shower bath, it will be advantageous to resort to them frequently; and when uneasiness at the epigastrium is often felt, a warm plaster will be worn in this situation with benefit.

45. The most active or varied means employed to restore the functions of the stomach will be frequently inefficacious if the offices of the collatitious viscera be imperfectly performed. The *biliary secretion* should therefore be promoted or corrected by occasional doses of blue pill, or PLUMMER'S pill with soap; and the bowels preserved moderately open by mild purgatives, or by a combination of them with bitters and tonics. With this view, rhubarb may be conjoined with aloes, guaiacum, and ipecacuanha, or with magnesia; the infusion of senna, with the infusion of gentian; the compound decoction of aloes, with the decoction or extract of taraxacum; the sulphate of potash with rhubarb; the purified extract of aloes with Castile soap, &c. These and other mild purgatives may be taken in other combinations, as draughts, mixtures, or pills, as prescribed in numerous and various forms in the *Appendix*, and in the article CONSTIPATION. A judicious combination of bitters with mild purgatives, as of sulphate of quinine, or inspissated ox-gall with aloes (F. 562, 575); the infusion of senna with any of the bitter infusions (F. 266); and the decoction of aloes with soda and infusion of columba, will generally be extremely useful in this state of the complaint.

46. When chronic asthenic dyspepsia is attended, not only by a torpid state of the liver, but also by incipient cachexia, or has given rise to cutaneous eruptions, &c., much benefit will result from the simple preparations of sarsa, with liquor potassæ or BRANDISH'S alkaline solution, and extract of taraxacum. If it have occasioned difficult or impaired menstruation, or a state of incipient chlorosis, as often observed in females in London, the preparations of iron, particularly the mistura ferri composita, the decoction of aloes being taken so as to act freely on the bowels; or the pilula ferri composita, conjoined either with the pil. aloes cum myrrha or the pil. aloes composita, will generally remove all disorder, if sufficiently persisted in, and aided by change of air, diet, and exercise.

47. In this form of dyspepsia, the restoration of the digestive functions much depends upon a healthy state of the other excreting organs, as well as of the bowels. The functions of the kidneys and of the skin should be duly promoted and corrected. The temperature of the general surface and the exhalations from it ought to be preserved, and the urine duly examined, in order to ascertain, not only its appearance, but the general character of its chemical constituents. As these vary, or as certain of them predominate, so should some of the most efficacious medicines prescribed in the complaint be varied or altogether changed; so should tonics be conjoined with alkalies or acids; and aperients and alteratives be given with absorbents or deobstruents.

[In this form of dyspepsia, unattended with gastric irritation, we have found the *chalybeate* waters of Saratoga very beneficial, taken in moderate quantities, and at regular intervals. A tepid bath of 70°, or a shower bath of the same temperature, or colder if the impression is agreeable, should be used night and morning while drinking the waters, and as much exercise taken on foot as possible short of producing much fatigue. This, with a diet consisting of tender beefsteak or mutton chop, plain-boiled rice, stale wheat bread (or that made of the unbolted meal if the bowels are costive), and these taken in very moderate quantities, at an interval of at least six hours, will, in a large majority of cases, afford decided relief, if not effect a permanent cure. In the treatment of this disease, in those who have been accustomed to much intellectual exertion, it is absolutely necessary to enjoin a suspension of all mental labour; for, as this is one of the most efficient causes of indigestion in this country, so its entire suspension is essential to the removal of the malady.]

48. ii. *The irritative variety of dyspepsia* requires very different means of cure from those just advised; but the removal of the exciting causes is as necessary in the treatment of it as in that of the foregoing.—*a.* In the more *acute states* of this variety, when pain, tenderness, heat, or soreness is felt in the epigastrium, although the vascular disorder of the villous surface may not amount, it nearly approaches to inflammation; and erethism, or vascular congestion, at least, exists. The application of *leeches* to the epigastrium then becomes necessary. In plethoric persons, a *bleeding* from the arm should be preferred. In those who have suffered from hæmorrhoids, or obstructions of the liver, *cupping* on the hypochondria, and in

females whose catamenia are deficient, leeches to the groins, may be prescribed. Afterward a large rubefacient plaster, formed either of equal parts of the compound pitch and ammoniacal plasters, or of seven parts of the former with one of the cantharides plaster, should be applied over the epigastrium. The blue pill, or hydrarg. cum creta, should be taken at bedtime, and a mild aperient in the morning. Fresh castor oil, assisted by cathartic enemata, will be useful in this variety. In some of the more acute cases, a full dose of calomel, either alone or with a little JAMES's powder, will be of service. Although calomel, when frequently exhibited, weakens the nervous energy, yet an occasional dose diminishes vascular action in the villous coat of the stomach, and excites the actions of the lower bowels. It should be followed by mild purgatives and active enemata; for by increasing the organic actions of the lower portion, the morbid states of the upper parts of the digestive tube will the more readily subside. When this variety of dyspepsia is attended by an erythematic *redness*, or *soreness of the fauces and pharynx*, as it frequently is, sometimes extending down along the œsophagus, calomel, taken in the form of powder, aided by mild aperients and active enemata, will be of essential service, not only in acting in the manner just stated, but also in promoting the secretions of the liver and intestinal canal.

42. The other *urgent symptoms*, noticed with reference to the former variety, are generally much more severe in this, and require a somewhat modified treatment. But irritation, erethism, congestion, or even inflammatory action of the villous coat are not the only pathological states characterizing cases of this kind. Organic nervous power, the secretion of the gastric juices, and the tone of the coats of the stomach, are more or less weakened or disordered, and require to be strengthened as well as corrected. At first, cooling medicines and diaphoretics are required, in order to remove irritation or vascular excitement; but they should afterward be conjoined with mild tonics or gentle restoratives, and aided by a light farinaceous diet (§ 72). If *nausea* or *vomiting* occur in this variety, the means already prescribed (§ 40, 41) will generally remove them. If they proceed from irritating ingesta, the gentle measures noticed above (§ 39) will procure their expulsion. Afterward, small doses of the nitrate of potash, and of the solution of the acetate of ammonia, may be taken in camphor water. When this variety is caused by intemperance, these medicines, aided by abstinence, will prove particularly serviceable. If pain or internal heat is complained of, or if vomiting continues after offending matters are removed, or after vascular depletion has been practised, the warm turpentine epithem, or a mustard poultice, may be applied over the region of the stomach, or one of the liniments above referred to may be used as an embrocation in the same situation. The anodynes advised for the asthenic variety may also be taken, and cathartic enemata administered, until the bowels are freely evacuated. The medicines already recommended for *heartburn*, and for other unpleasant symptoms, will also be appropriate after having had recourse to the means just advised.

[Some cases of indigestion are attended with vomiting and diarrhœa. Under such circumstances we should aim to allay the irritability of the mucous surfaces by mild opiates and antacid or absorbent remedies: the *hyd. cum creta*, gr. ij., with one grain of DOVER's *powder*, may be given two or three times a day; or, if acidity be present, the *carbonate of soda* with *morphia*, or a grain or two of *rhubarb* with the same anodyne. The *hydrocyanic acid* is also a valuable remedy in these cases, combined with the *chalk mixture*; and we have derived great benefit from applying a few leeches over the epigastrium, and then a small blister, which should be dressed with a cerate containing three or four grains of morphia to the ounce. The diet, of course, should be chiefly farinaceous.]

50. *b.* In the *chronic states* of irritative dyspepsia, local depletions are requisite only when there is evidence of plethora, or of increased action, or when natural secretions or accustomed evacuations are suppressed. Small doses of mild mercurials at bedtime, the simple preparations of sarsa, either alone or with liquor potassæ, and external derivatives, are here extremely beneficial. After the secretions have been improved by these, and the excreting functions restored, the milder tonics, conjoined with refrigerants and diaphoretics or anodynes, will be of great service. The decoction of Iceland moss, and various other demulcents, may be taken with hydrocyanic acid; and a plaster, consisting of either the ammoniacal, the compound pitch, or the compound galbanum plaster, may be worn on the epigastrium. I have generally preferred a plaster consisting of equal parts of the compound pitch and of the ammoniaco-mercurial plasters, and prescribed the following:

No. 262. ℞ Potassæ Nitratis ʒss.; Liquor. Ammoniæ Acetatis ʒi.; Infusi vel Decocti Cinchonæ ʒiii. M. Capiat Coch. ii., vel. iiii., larga bis terve in die.

No. 263. ℞ Potassæ Nitratis ℈i.; Liquoris Ammoniæ Acetatis ʒi.; Aquæ Flor. et Infusi. Aurantii Comp. ää ʒiiss. Misce. Capiat tertiam partem, ter in die.

No. 264. ℞ Acidi Hydrocyanici, M. ii., Mist. Amygdalæ Dulcis; Aquæ Flor. Aurantii, et Mistur. Camphor. ää ʒss. M. Fiat Haustus ter in die sumendus.

No. 265. ℞ Infusi Lupuli, ʒivss.; Acidi Hydrocyanici, M. viii.; Tinct. Aurantii et Tinct. Gentianæ Comp. ää ʒii. M. Capiat quartam partem bis terve in die.

No. 266. ℞ Liquoris Potassæ, ʒiss.; Decocti Sarsæ, ʒvii.; Extracti Sarsæ, ʒiss.; Tinctur. Hyoscyami, ʒi.; Tinct. Aurantii, ʒiii.; Sirup. Sarsæ, ʒii. M. Fiat Mistura, cujus capiat partem quartam ter quaterve in die.

No. 267. ℞ Infusi Valerianæ, ʒx.; Acidi Hydrocyanici ℥ii.; Sodæ Carbonatis, gr. x.; Tinct. Cardamom. Comp., ʒi.; Spirit. Lavand. Comp., ʒss. M. Fiat Haustus ter in die sumendus.

[In cases of indigestion attended with pain and constipation, Mr. LANGSTON PARKER (*The Stomach in its Morbid States*, &c., Phil., 1841) recommends the following formulæ as affording much relief: ℞ Pulv. Rhei, gr. iv.; Morphiæ Muriatis, gr. $\frac{1}{12}$. M. Ft. pill. ter die sumend. Cum Cochlear., iij., larg. Misturæ sequent. ℞ Infus. Cascarillæ, ʒvii.; Magnes. Sulphatis, ʒss.; Magnes. Carb., ʒjss.; Tinct. Aloes, ʒss.; Acidi Hydrocyanici, gtt. xv.; Tinct. Humuli, ʒij. M. Cap. Cochlear., iij., larg. ter die. These preparations are said to act freely on the bowels, without occasioning pain. After constipation has been obviated, the following preparation will be found very useful: ℞. Magnes. Carb., ʒj.; Bismuth Subnit., gr. v.; Morphiæ Muriatis, gr. ℈. M. Ft. pulv. ter die sumendus. The indications un-

der this form of the malady are to remove pain and obviate constipation, by which it is always aggravated, to subdue concomitant inflammatory action, and to enable the stomach, when these intentions have been accomplished, to fulfil its offices again properly. As laxatives, in the treatment of indigestion attended with constipation, we have derived great benefit from the use of the following preparations: ℞ Pulv. Rhei, ʒij.; Pulv. Ipecac., gr. x.; Ol. Carui, gtt. x.; Sirup Commun., q. s. Ft. mass. et div. in pilul. xl.; or, ℞ Gum Mastic, Pulv. Aloes, ää. ʒj.; Pulv. Ipecac., gr. x.; Ol. Carui, gtt. x.; Muc. Gum Arabic, q. s. Ft. mass.; div. in pilul. xx. Rhubarb, aloes, ipecacuanha, and soap make a very good preparation; as does also the following: ℞ Pulv. Rhei, ʒij.; Pulv. Gentian., ʒj.; Sodæ Carbon., ʒij.; Aq. font., Oj. M. Ft. infus.]

51. iii. *Treatment of the earlier consequences of dyspepsia.*—The treatment of several of these is fully discussed in the articles Duodenum, Flatulence, Headache, Hypochondriasis, Pyrosis, and Stomach—*Painful Affections of.* It will therefore be unnecessary to advance much under this head.—*a.* When dyspepsia, in either of its forms, causes frequent attacks of relaxation and soreness of the throat and fauces, or inflammatory redness of these parts with cough, the diet of the patient should be strictly regulated, and mild purgatives, aided by cathartic enemata, prescribed. These attacks should not be neglected in persons presenting any tendency to bronchitis, or to pectoral disease. Some of the severest states of laryngitis and tracheitis have originated in irritative dyspepsia, the symptomatic irritation of the pharynx and fauces extending to the larynx, and exposure to cold, to currents of air, or to other causes, heightening the affection of the respiratory passages. A predisposition to affections of the respiratory organs, or tubercles in a latent state, are then often called into activity by neglected dyspepsia, owing either to symptomatic irritation or to consequent debility. In females, excessive menstruation, as to either the frequency or quantity of the discharge, is often the more immediate consequence, or intervenes between the dyspeptic disorder and the pulmonary affection. In such cases the treatment should be directed both to the original disorder and to the consequent affections; and, fortunately, much of the means, both medicinal and dietetical is appropriate to both, the more astringent and refrigerant tonics, and mild or cooling aperients, benefiting the disorder of the stomach as well as the superinduced complaints. To these medicines, ipecacuanha, camphor, and narcotics will be added with advantage.

52. *b.* The *symptomatic disorder of the heart*, consequent upon one or other of the varieties of dyspepsia, requires chiefly attention to the original complaint. When palpitation is frequent, or the pulse intermittent, after the bowels have been freely evacuated and the secretions improved, camphor and ipecacuanha with hyoscyamus; the sulphate of iron with extract of hop; the decoction of senega with orange-flower water, or infusion of orange peel and hydrocyanic acid; the infusion of valerian similarly combined; the nitrate of silver triturated with the extract of henbane, or of hop, will severally afford relief. In the irritative states of dyspepsia, particularly if signs of congestion, erethism, or inflammatory irritation of the villous coat be present, the treatment advised above for this state ought to be premised. At the same time, some one of the warm plasters already prescribed may be applied to the epigastrium. In 1820 I first employed the *nitrate of silver*, combined with narcotics, for a case of dyspeptic palpitation, commencing with half a grain thrice daily, and increasing the dose to one grain. This patient, and others similarly affected, for whom I have ordered this medicine, perfectly recovered. Dr. J. Johnson has strongly recommended the nitrate of silver in dyspepsia; and, certainly, few medicines are more deserving adoption, when the patient is not alarmed at its use. It should, however, be very cautiously employed. This writer also insists much upon the use of the *sulphate of quinine* in most dyspeptic cases. In small doses, with sulphuric acid, in infusion of roses, it is an excellent medicine at that stage of the treatment when active tonics should be prescribed, especially when much debility is complained of. In order to prevent its constipating effects, it may be given with small doses of the purified extract of aloes, or with the aloes and myrrh pill; and when palpitations and other nervous symptoms exist, camphor and hyoscyamus will be added to them with great benefit. In females who have long laboured under dyspepsia, the quinine, taken in solution, is very serviceable when the catamenia are too abundant; but in other circumstances, particularly when a *chlorotic* state of the system, and impaired or obstructed menstruation have supervened, the *sulphate of iron* with the aloetic preparations should be preferred.

53. *c.* Of all the consequences of protracted and irritative dyspepsia, *disorder of the biliary functions and disease of the liver* are the most common. When evidence of congestion, or fulness, or tenderness in the region of the liver exists, then the treatment should be commenced with general or local depletions, with cupping on the hypochondrium or near the right shoulder blade, or with the application of a number of leeches near the epigastrium, or around the anus. Small doses of blue pill, or of calomel, ought to be taken occasionally at bedtime, and to be followed by saline aperients in the morning. Alterative medicines, consisting chiefly of the alkaline carbonates, or of the liquor potassæ, should be given daily, with taraxacum, sarsa, and such of the other remedies above recommended as may be appropriate to the case; but the treatment of this complication is fully discussed in the articles Gall-bladder and Ducts, Jaundice, and Liver.

54. *d. Cutaneous eruptions*, both acute and chronic, frequently are associated with the more protracted states of dyspepsia, and are often consequences of these states. Yet they are seldom referred to these sources, or to these conditions of the villous surface of the stomach, of the digestive mucous surface generally, and of the biliary and other excreting functions with which they are so intimately connected. In numerous instances, heating, stimulating, and irritating medicines are prescribed, either prematurely, or at a time or stage of the treatment of these eruptions when

local or general depletions, refrigerants, evacuants, alteratives, and a low, cooling diet ought to have been employed. This remark is applicable also to those early indications of biliary disorder, of affections of the kidneys and urinary bladder, and especially of gout, which so often appear in the course of chronic indigestion.

[To these most comprehensive and judicious directions of our author but little remains to be added. From a somewhat extended experience in the treatment of the different forms of indigestion, we are inclined to believe that far too little attention is generally paid to restoring and maintaining the healthy functions of the skin. We can call to mind several most obstinate cases which had resisted the whole routine of remedies usually employed for this affection, and which readily yielded to the daily employment of the vapour bath, friction with the hair glove and the flesh brush, and other means to restore cutaneous action. We believe, therefore, with Professor Chapman, who has laid down most admirable precepts on the management of dyspeptic maladies (*Lectures on the more important Diseases of the Thoracic and Abdominal Viscera*, Phil., 1844), that it is, for the most part, well to let the stomach alone, or, forbearing the use of every sort of internal medicament, and particularly of any activity, to endeavour to abate and draw away the irritation to the exterior surface by a combination of depletory and revellent means, as local bleeding, rubefacients, sinapisms, vesicatories, the vapour, tepid, and warm baths, or the Croton oil, so as to induce pustulation. When the latter is employed, if the irritation seems to be seated in the ganglionic nerves, it is preferable to make the application to the epigastrium, but over the spine when the irritation seems to proceed from the rachidian axis. Dr. C. recommends to cup the spine and counter-irritate the epigastrium. "By this simple plan," says he, "aided by the regimen hereafter to be pointed out, I have met with no difficulty in arresting the progress of the disease, and am persuaded, from ample experience, that it is the one which only will be found productive of any uniformity of success. As corroborative of the correctness of this view, in theory and practice, it may be remarked, that whenever a metastasis of the irritation takes place to the surface, as an efflorescence or any other form of eruption, relief is ordinarily afforded. Nor to the other and rarer form of the disease, dependant principally on a want of muscular contractility alone, from imperfect innervation, have I found this plan less applicable. It might, indeed, be affirmed to be more prompt and effectual under such circumstances. Cases without number have I known with a permanently distended stomach, and the indescribable wretchedness of this state, which, after refusing to yield to every variety of internal remedy, were very speedily cured by the topical applications to the exterior already enumerated."—(*Loc. cit.*, p. 224.)]

55. Of the Diet and Regimen in Dyspepsia.—Unless the *diet* of the dyspeptic be duly regulated, medical means will be employed in vain. On the subject of diet with reference to indigestion, Dr. Paris, Dr. A. Combe, Dr. Robertson, Dr. Ticknor, Dr. T. J. Todd, and Mr. Mayo have furnished much information of the best kind, and conveyed it in the most agreeable manner. It is impossible to adduce anything on this topic which has not been already stated and illustrated by these able writers.—i. *In considering diet with reference to indigestion generally*, there are various circumstances requiring particular notice: 1st. The kinds and quality of the food; 2d. The quantity and congruity of the food; 3d. The times of eating, or the periods which should intervene between meals; 4th. The kind and quantity of drinks; and, 5th. The conditions deserving notice in connexion with eating and drinking.

56. *A. The kinds and quality of food.*—*a.* Dr. Combe justly remarks that a direct relation ought always to subsist between the qualities of the food and the nature of the constitution which it is intended to support. The highly concentrated and stimulating food necessary for the support of those who take very active exercise will prove too exciting to the irritable constitution of persons possessed of great activity of the brain and nervous system; and the generous diet which suffices to rouse or support a phlegmatic system will prove too nutritive for a person of a florid and sanguine temperament. For persons of a florid complexion, with great activity of the circulation, and a consequent liability to inflammatory diseases, the food ought to be calculated to soothe rather than to stimulate. Red meat, spices, wines, and fermented liquors ought to be used sparingly, and the principal support derived from soups, fish, mucilaginous vegetables, acidulous fruits, and diluting drinks. In lymphatic persons, on the other hand, where the circulation is weak and slow, and the functions feeble, benefit is derived from a larger proportion of animal food, while vegetables, soups, and fluids prove relaxing. To these persons, wine in moderation and spices are useful, if much exercise be taken. Persons of a highly nervous temperament, of great excitability and sensibility to impressions, are injured by heating or stimulating diet. White meats, as fowl and fish, farinaceous and mucilaginous aliments, and ripe fruits, are most appropriate to them. Where the bilious temperament predominates, and much active exercise is taken in the open air, a full supply of animal food is necessary, and a moderate allowance of wine or other stimulus is borne with less detriment, if not with more advantage, than in the sanguine and nervous temperaments. Where the constitution is of a mixed nature, a diet composed of animal and vegetable substances, in nearly equal proportions, is, under ordinary circumstances, the best. The food, also, should be adapted to the age, state of health, and mode of life of the individual, and to the climate and season of the year. A diet which would be quite sufficient to a person of sedentary occupations would be inadequate to support an individual subjected to frequent or constant exertion; and in warm climates and seasons, a smaller supply of food, particularly of a heating or stimulating kind, is necessary than in cold and temperate countries. In the former but little animal food is requisite; in the latter, especially in very cold regions and in rigorous seasons, an abundant supply of this kind of diet becomes indispensable.

57. *b.* Although there are few articles of diet which a healthy person, leading a sufficiently active life, may not eat with impunity, there are many which ought to be preferred, and others which should be avoided by the dyspeptic. *Vegetables* are slower of digestion than animal and farinaceous aliments, and more liable to undergo the acetous fermentation in weak stomachs, and to occasion acidity and flatulence. Fat and oily meats are also very indigestible, and give rise to acid or rancid eructations and heartburn. Soups and liquid food are acted upon by the stomach with great difficulty; and if the diet consist chiefly of them, they furnish insufficient nourishment, and never fail of producing the more severe forms of dyspepsia, and the diseases of debility. Soups are hurtful when taken at the commencement of a full meal; but when little or no animal food is eaten along with them, and rice or bread is taken with them, so as to promote their consistency, they are digested with greater ease. Pastry, puddings, rich cakes, and articles containing fatty or oily matter, are the most indigestible of all kinds of food. Plain, well-cooked animal food, particularly venison and game, kept a due time after it has been killed, and eaten in moderate quantity with bread, or with roasted, mashed, or dry mealy potatoes, or with rice, is one of the most digestible meals that can be taken by the dyspeptic. The kind, however, of animal food, and the modes of dressing it, should depend much upon the state of disorder, and the age and constitution of the patient.

58. *c. Fish* holds an intermediate rank between the flesh of warm-blooded animals and vegetable food, as respects digestibility. It is less nutritious than mutton or beef; and a larger quantity is requisite to satisfy the appetite. Whiting, haddock, and skate are the most digestible of salt-water, and perch of fresh-water fish. Gurnard, cod, soles, and turbot are successively richer and heavier, but easier of digestion than mackerel, herrings, eels, or salmon. Eels are, however, more digestible when they are stewed. Salmon is very indigestible, as usually obtained from the London fishmongers, for the reasons stated in the article Disease (§ 46); but it is not indigestible when quite fresh and properly cooked. The same observation applies to mackerel and herrings. Fish is most digestible when *boiled*; it is less so when *broiled*; and the least so when *fried*. The dyspeptic should eat it dressed only in the first of these ways. Shell-fish is slow of digestion; some much more than others. Raw oysters are more digestible than crabs or lobsters; but oysters, when stewed or otherwise cooked, are heavier than either. Fish is often rendered indigestible by the sauces, &c., taken with it. Vinegar, however, and lemon juice promote the digestion of it. Malt liquor ought not to be drank with fish. Fruit should not be eaten with it; and milk, likewise, should be avoided.

59. *B.* The *quantity of food* should always be proportioned to the digestive powers of the stomach and the wants of the system. Where waste is great, and growth active, an abundant supply of food is requisite, and the desire for it is commensurate with the demand. Those who lead sedentary lives, and whose circumstances admit of free living, are peculiarly liable to dyspeptic complaints, owing chiefly to the quantity of food indulged in. It is indispensable to a due and natural supply of aliment to the stomach, that attention be paid to the preliminary processes of mastication and deglutition. If these be performed too hastily, too much food will be received in a short time, in a state of insufficient preparation, and the stomach will be overloaded before the sensation of hunger can be completely allayed. As the dilatation of the stomach by the ingesta should be gradual, and ought not to exceed a certain limit, and as a definite quantity of gastric juice is secreted, according to the wants of the system and the habits of the individual, if more than the usual quantity of food be taken, the organ will be over-distended and a part of it will remain undissolved, producing the usual symptoms of indigestion. Such being the case even with the healthy, how much greater will be the disorder when excesses are committed by the dyspeptic. Sir F. Head very justly remarks "that almost every malady to which the human frame is liable is either by high-ways or by-ways connected with the stomach; and I must own I never see a fashionable physician mysteriously counting the pulse of a plethoric patient, or, with a silver spoon on his tongue, importantly looking down his red, inflamed gullet, but I feel a desire to exclaim, 'Why not tell the poor gentleman at once, Sir, you've eaten too much, you've drunk too much, and you've not taken exercise enough!'" Dr. Abercrombie observes, "when we consider the manner in which diet is generally conducted in regard to the quantity and variety of food and drink, instead of being astonished at the prevalence of indigestion, the wonder should be that any stomach, having such duties imposed on it, is capable of digesting at all." Much, certainly, is to be done in dyspepsia by attention to the quality of the articles of food, but *much more depends upon the quantity*; indeed, the dyspeptic might almost be independent of attention to the former if he rigidly observed the latter. This opinion is supported by the experiments of Dr. Beaumont, showing that the power of digestion is limited by the amount of gastric juice provided by the stomach—an amount varying with the modes of life and the wants of the system. It is superfluous to remark that second courses, served up to gratify the pride of the host, overcome the stomach, paralyze digestion, and occasion acute attacks of indigestion.

60. It is impossible to assign any rules respecting the quantity of food that should be taken, as it depends upon so many circumstances. Mixtures of different kinds of food are injurious to digestion, chiefly by the inducement to excess in quantity which the variety affords, and by the incongruity of many of the articles. When only one dish is partaken of, Dr. Combe remarks, there is less temptation to exceed the quantity than when several are tried. The first intimations of a satisfied appetite are warnings to stop eating, which should never be neglected by dyspeptics. If these be passed by, indigestion, or an aggravation of it where it is already present, will always result. The quantity of food should also have reference to the amount of exercise. When little or no waste is excited by exercise, the supply should

be remarkably moderate, as well as digestible. Persons who have removed from the country, where they have enjoyed active exercise in the open air, and have consequently digested well a full diet, generally become dyspeptic when they have removed to large towns, and are subjected to very different circumstances, especially if they continue the same quantity of food, or if they increase it.

61. *C.* The *times of eating*.—In general, five or six hours should elapse between one meal and another. Even in healthy persons, digestion of a full meal is seldom over in less than four hours; and in dyspeptics it is seldom disposed of until a much longer period has passed. The stomach, also, requires an interval of rest after the process is finished, in order to enable it to enter upon the vigorous digestion of the next meal. If food be taken before the organ has recovered itself from its previous exertion, the secretion of the gastric juices and the muscular contractions will be imperfect. The whole of the gastric juice which the stomach can secrete in a given time being engaged in the digestion of the first meal, the one taken too closely upon it will be insufficiently acted upon, and thereby undergo fermentation. The intervals between meals should be in relation to the quantity eaten, and the habits of the individual as to air and exercise. When the latter are enjoyed, the periods may be much shorter than when the habits are sedentary.

62. For dyspeptics, as well as for healthy persons, the meals should be regulated according to the necessary occupations and habits of the individual. For those, observes Dr. Combe, who work by day and sleep by night an early breakfast, an early dinner, and an early evening meal will be most conducive to health; but for those who, against the laws of nature, keep late hours, late breakfasts and dinners are preferable. Persons who eat suppers ought not to breakfast till one or two hours after rising; but those who dine late, and eat nothing afterward, require breakfast sooner. As a general rule, breakfast about half an hour or an hour after rising will be found most beneficial. Those who are obliged to rise very early should take a cup of coffee or tea, with a biscuit, soon after getting up, and a more substantial breakfast about three hours afterward. If exposure to cold, to the morning dews, or to unwholesome air, or to any other cause of infection, be incurred in the morning, the stomach should be fortified by coffee or by breakfast. The dyspeptic, especially, ought never to travel, or to enter upon any exertion with an empty stomach, and never with an overloaded one.

63. As a general rule, not more than five or six hours should elapse from breakfast till dinner. For youth and convalescents, and for persons taking active exercise in the open air, the interval may be somewhat shortened; but for sedentary persons it may be much prolonged. Much, however, should depend upon the appetite, which ought to have returned some time before dinner is taken. According to this, the most suitable time for this meal is about two o'clock. As many dyspeptics as well as others cannot dine until much later in the day, ought nothing to be taken till five, six, or seven o'clock! or ought a light repast to be taken at one or two o'clock, and the appetite be chiefly reserved for a substantial meal at a much later hour! When dinner cannot be taken until eight or nine hours after breakfast, it will be necessary to have some refreshment in the mean time; but it should be in relation to the time that will elapse until dinner, and to the exercise taken. For persons of sedentary habits, a biscuit and a glass of water will be sufficient; but for the active and the young, especially if the interval be long, a more substantial luncheon is necessary. The habit of resorting to pastry-cooks for refreshment, and of taking wine with it, is generally prejudicial, and particularly in dyspepsia. When dinner cannot be taken until a late hour, it should always be postponed for half an hour or an hour, until excitement or fatigue has subsided.

64. When the dinner is early—from one to three o'clock—a light meal of tea or coffee and bread is necessary; but when the dinner is late, or little exercise is taken after it, tea or coffee should be used merely as a diluent, and no food ought to be eaten. After an early dinner, admitting of time for its digestion and a return of the appetite before a late hour, a third meal, of light aliments, and in moderate quantity, should be taken, particularly by persons engaged in the open air. When ultra-temperance is practised by the dyspeptic, particularly when he lives actively, and retires to bed with an entirely empty stomach, he is quite as likely to have disturbed sleep and unpleasant dreams as if he had his stomach loaded. He may even be wakeful and irritable, or experience a sense of unpleasant emptiness or gnawing at the stomach. All these may be removed by a basin of arrow-root or sago about an hour before bedtime. A light supper may, therefore, be taken when the dinner is early; but it should be at least an hour or two before retiring to rest.

65. *D.* The dyspeptic, as well as other valetudinarians, inquire, *What ought we to drink?* but they rarely follow the question by the next important one, *When should we drink?* And they never inquire as to *the temperature at which fluid should be taken.*—*a.* Respecting the *first* of these questions, it may be stated that *water*—either spring water or toast-water—is the safest if it be taken only according to the dictates of thirst. Whey, fresh small beer, soda water, and Seltzer water, are of service in many cases, as will be noticed hereafter; but fermented liquors and wines require greater restrictions. The young dyspeptic ought never to drink anything but water, toast-water, or whey. The more stimulating beverages will be prejudicial to him, unless during states of debility, for which it may be necessary to prescribe them medicinally. Of all these, spirituous liquors are the most injurious, and ought never to be taken in any form, nor in any variety of indigestion. Some of the asthenic states of the complaint, which are benefited by a moderate use of wine, are exasperated by spirits, or even by malt liquors. Dr. Beaumont found, on examining St. Martin's stomach after a free indulgence in ardent spirits for several days, the villous surface covered with erythematic and aphthous patches, the secretions vitiated, and the gastric juice diminished in quantity, viscid, and unhealthy, although he complained of nothing, not even of impaired appetite. Two days later, when matters were aggravated, the

erythematic appearance was more extensive, the spots more livid, and from the surface of some of them small drops of grumous blood exuded. The aphthous patches were larger and more numerous, the mucous covering thicker than usual, and the gastric secretions much more vitiated. The fluids extracted from the organ were mixed with much thicker ropy mucus and muco-purulent discharges, slightly tinged with blood. Yet St. Martin complained only of an uneasy sensation, and a tenderness at the pit of the stomach, with vertigo and dimness of vision on stooping. The tongue was covered with a yellowish brown coating, and the countenance was somewhat sallow. After a few days of low diet, with mild diluents, the inner surface of the stomach assumed its healthy state, the gastric juice became clear and abundant, the secretions natural, and the appetite voracious. Dr. Beaumont adds that the free use of ardent spirits, wine, beer, or any intoxicating liquor, when continued for some days, invariably produced these morbid states. Eating voraciously or to excess, and swallowing food imperfectly masticated, or too fast, produced the same effects when repeated frequently in close succession. (*Exper. and Observ.*, &c., p. 237.) He often observed that, when stomachic disorder, with febrile symptoms, was present, or when influenced by violent mental emotions, the villous coat of the stomach became red, irritable, and dry; and that but little gastric juice was secreted on the food being taken; digestion being very much prolonged. No more wine, therefore, nor more of any other fermented liquor, should be taken, than may be found sufficient to support the strength and ameliorate the symptoms of the dyspeptic without quickening the circulation.

66. *b.* As a general rule, the *desire for fluids* is the chief indication of *the time* at which they ought to be taken; but large draughts should be avoided, as the stomach becomes suddenly distended, the juices diluted, and the muscular coat weakened by them. Besides, much more fluid may be thus taken than is necessary for the wants of the system. The dyspeptic ought never to drink largely, either during or soon after a meal. Frequent sipping, or drinking by mouthfuls, will be much more beneficial, and, ultimately, more quenching of thirst. Mild drinks are best taken about three or four hours after a solid meal. It is then that tea and coffee are used as beverages. These are always injurious when made too strong, or taken in large quantity, especially to the dyspeptic. Soda water drank at the time of dinner is hurtful, by distending and over-exciting the stomach. Seltzer water is less so; but it is often of service some time after a meal, when there is much thirst. Soda water is then sometimes also of use.

67. *c.* The *temperature at which fluids should be taken* is of the utmost importance to the dyspeptic. *Extremes* of temperature are injurious even to the healthy, and not only to the stomach, but also to the collatitious viscera, and to the teeth. The bad effects of the ingestion of large quantities of cold water into the stomach have been often demonstrated; but the subject has been very superficially considered. Dr. Beaumont remarked that a gill of water, at the temperature of 55°, received into St. Martin's stomach when empty, reduced the heat of the organ from 99° to 70°, at which it stood for a few minutes, and then rose very slowly. This experiment explains the injurious effects produced upon weak stomachs by cold fluids taken during digestion, and the fatal effects of very copious draughts of cold water while the body is fatigued and perspiring; the shock which the constitution receives from having the temperature of the most vital and central organ suddenly and remarkably depressed paralyzing the other vital movements. It having been demonstrated that a temperature of 98° is requisite to healthy digestion, it must follow that the use of ices, and particularly iced creams after dinner, or when digestion is proceeding, will be most injurious. A fit of indigestion is often caused by them; and they seldom fail of lowering the vital tone of the stomach during the digestive process. The moderate use, however, of cold or iced water, or of water ices, when this process is completed, and when there is no exhaustion, is beneficial, by inducing a salutary reaction in the organ. Ices can be only taken slowly, and in small quantities at a time; hence they produce a much less sudden fall of temperature of the stomach than draughts of cold fluids. Dr. Dunglison states that labourers in Virginia were frequently killed by drinking copiously of spring water when overheated; but that such accidents have rarely occurred since they have been supplied with ice. The proper temperature at which soups, tea, coffee, chocolate, &c,, should be taken may be stated at about 100°; and at this grade of heat liquids will be found more quenching to thirst than at a higher or lower temperature.

68. *E.* The *conditions necessary to promote a healthy digestion* require a brief notice. The determination of the circulating fluids to the digestive mucous surface and collatitious viscera, and the copious secretion from these viscera during digestion, require that the function should not be disturbed by moral or physical perturbation or exertion. Rest of body and tranquillity of mind for a short time before and after, but particularly after eating, are hence conducive to digestion. Whatever derives the nervous energy and the circulating fluids from the digestive viscera, or causes oppression of these viscera, by overloading the large veins, is injurious during digestion. Hence bloodletting, hot or cold bathing, mental shocks, exertions of any kind, and other circumstances which operate in this way, are more or less hurtful. As the quantity of gastric juice requisite to the digestion of a full meal is generally secreted in an hour or an hour and a half after it is taken, or, at least, within two hours, even in the dyspeptic, bodily and mental repose is beneficial during this time. It is thus that a *siesta* after dinner is found so serviceable to the dyspeptic. But, by promoting digestion, it favours supply, diminishes waste, and consequently induces vascular plethora, and the usual consequences of this state, particularly in respect of the brain and liver. In dyspepsia, the desire for rest after a repast is great in proportion to the quantity eaten, the nervous energy being concentrated in the digestive viscera in order to dispose of the ingesta. The state of the mind has a powerful influence on digestion: hilarity and ease of mind pro-

mote this function; while care, anxiety, envy, and dissatisfaction impede it. Dr. Caldwell remarks that dyspepsia commences perhaps as often in the brain as in the stomach. It is almost exclusively a complaint of the studious, the scheming, the daring adventurer, the stock-jobber, and the speculator, and of those who, over-exerting their brains, thereby injure them.

69. ii. *Of the diet and regimen with reference to the different states of dyspepsia.* The observations of Dr. Todd as to the diet suitable to the different states of dyspepsia are extremely just and precise. I shall therefore avail myself of some of them.—*A. During the asthenic forms of indigestion*, the quantity of food should be reduced to the power of disposing of it; such articles as are difficult of digestion and weaken the stomach being altogether withdrawn.—*a.* The patient should be confined to a spare diet of animal food, and to a restricted use of fluids. A bulky meal ought always to be avoided; and when the appetite is impaired, abstinence will be frequently preferable to the use of stomachics. When the appetite does not fail, which is often the case when dyspepsia is produced by mental exertion, the patient should cease eating before the appetite is altogether allayed. The tea or coffee at breakfast should be taken with very little milk and sugar, and very little butter ought to be used. An egg, lightly boiled, may be eaten by those who take sufficient exercise. The dinner should consist of lean animal food, particularly mutton, poultry, game, and venison, which ought to be roasted or broiled. Bulky vegetables should be avoided; but mealy potatoes, yams, or rice, mixed with the gravy of the meat, young summer turnips, cauliflower, or French beans, may be taken sparingly. The least hurtful fruits are strawberries, morel cherries, and mulberries; but they should be eaten as a part of the luncheon, rather than after dinner. Fluids, even when there is thirst, should be taken slowly, and in small quantity, and always after a meal. If the digestion or habit require the stimulus of wine, old sherry, or old port, with an equal part of water, should be preferred; but the quantity of either, or of both, should not exceed two or three glasses. Twice-dressed meat, *rechauffées*, and made dishes ought not to be eaten; and the food should be masticated slowly and thoroughly.

70. *b.* The *kinds of food* most injurious in this variety of dyspepsia, and therefore to be avoided, are sweet, mucilaginous, or acid fluids, and such as contain much milk; puddings, compound dishes, and meat pies; new bread, or heavy unfermented bread; compact or fat dumplings, and pultaceous articles; creams, curds, custards, cheese, and all preparations of milk; fat meat, particularly pork or bacon, young meat, all gelatinous parts of meat, and salted or smoked meat; the less digestible species of fish, and all shell-fish; strong broths, gelatinous soups, or concentrated dishes; melted butter, oil, sauces, spices, condiments, and pickles; bulky or flatulent vegetables, especially cabbages, waxy potatoes, pot-herbs, beans, pease, cucumbers, &c.; most fruits, whether fresh or preserved; currants, gooseberries, apples, plums, melons, all kinds of nuts or kernels, and preserves or jellies. Malt liquors, particularly ale, perry, cider, home-made wines, punch, and shrub, should also be avoided.

71. *c. Regular exercise* ought to be taken in the open air; and the kinds of exercise that bring the greatest number of muscles into moderate action should be preferred. Celsus very justly advises persons subject to stomach complaints to exercise the upper extremities and parts of the body. There are several amusements which have this effect, especially billiards, fencing, rowing, cricket, &c. For females, singing, dancing, skipping, battledore, dumb-bells, and the exercises recommended by Mr. D. Walker, will be found very serviceable, especially when confined to the house by weather, or when exercise on horseback or on foot cannot be taken.

72. *B.* The *diet and regimen most suited for the irritative states of indigestion* differ considerably from those now recommended. In this variety, bland, farinaceous, and semi-fluid food, in small or moderate quantity, is the most appropriate, until vascular disorder of the villous coat of the stomach is removed by treatment. Saccharine, farinaceous, feculent, mucilaginous, and acidulous articles of food are most easily digested in this condition of the organ. Gentle exercise, as gestation in a carriage or on horseback, sailing, swinging, and walking, is preferable to the more exciting kinds of exercise. After digestion is completed, tepid or warm bathing, and frictions of the surface are generally beneficial. When vascular excitement is removed, the patient may gradually adopt the diet advised for the preceding variety, beginning with light chicken, mutton, or veal broth, with toast or rice; and afterward the more digestible kinds of solid food may be used.

73. *C.* The *wines and beverages* best suited for indigestion are old sherry or port, diluted with equal parts of water, the finer kinds of claret, hock, white hermitage, and Sauterne; but these should not be taken in the irritative forms of dyspepsia until vascular excitement of the villous coat of the stomach is removed. The diluents most beneficial are Seltzer water with a small quantity of hock, or Seltzer water with milk or whey, or limewater with milk or black tea, according to the peculiarity of the case. In the more irritable states of the stomach, whey, goat's whey, small quantities of Seltzer water, or the imperial drink, should be preferred. When the state of the urine indicates the impropriety of using vegetable or mineral acids, the alkaline carbonates may be substituted; but, when indigestion has induced a torpid or disordered state of the biliary organs, not connected with inflammation, beverages slightly acidulated with the nitro-hydrochloric acids will be found serviceable.

74. *D. Several mineral waters*, both natural and factitious, are most excellent aids in the treatment of the several forms of indigestion. —*a.* In the *asthenic variety*, the mineral springs of Clifton, Malvern, Bath, and Tunbridge Wells, and the carbonated chalybeate waters of Spa, Pyrmont, Carlsbad, Marienbad, Swelbach, and Eger, on the Continent; or their imitations prepared by Dr. Struve, are generally beneficial.—*b.* In the *irritative states* of dyspepsia, the springs of Harrowgate, of Ems, Plombières, Vichy, and of Marienbad, or other alkaline

mineral waters, will be used with advantage. When the functions of the liver are disordered, the waters of Cheltenham or Leamington, or of the Boulah Spa, and the springs of Seidschutz and Pullna, may be preferred; but when excitement of the villous coat of the stomach, and when the functions of the excreting viscera are restored, the aerated chalybeate waters already mentioned will be most serviceable.

[With respect to the use of the natural mineral waters in this disease, Dr. CHAPMAN gives the preference to the sulphur waters of Virginia, "as well from superiority of climate as the greater diversity of qualities. Imbosomed within a mountainous region," he adds, "where the heats of summer never penetrate, and from which the diseases of the season are excluded, there is, within a very limited space, a group of some ten or fifteen of these waters, of decided activity, including natural baths of every gradation of temperature and difference of medication. Not a little is to be ascribed to their medical properties, though, in a just appreciation of them, we must also include the advantage of the change of scene, a purer air, a more cheerful society, and the interruption of pernicious habits and associations. It is in these modes that a long journey over a delightful district of country, or a visit to a European metropolis, or a residence in some of the genial climates of that section of the world proves so effectual."—(*Loc. cit.*, p. 252.) We have little doubt that it is generally owing to these latter influences, and not to the qualities of the waters, that dyspeptic invalids are so often indebted for an amelioration of their sufferings, although, under circumstances already indicated, the chalybeate waters are decidedly beneficial.]

BIBLIOG. AND REFER.—*J. P. de Lignamine*, De Unoquoque Cibo et Potu Utili et Nocivo. Rom., 4to, 1474.—*C. Apicius*, De Arte Coquinaria. Mediol., 4to, 1498.—*B. Fiera*, Cœna, de ea Medicæ Artis quæ in Victus Ratione Consistit. Argent., 8vo, 1530.—*B. Platina*, De Honestâ Voluptate, de Ratione Victus, &c. Par., 12mo, 1530.—*Albengnefith*, De Virtutibus Ciborum et Medicam. Argent., fol., 1533.—*C. Langthon*, an Introd. into Physike wyth an Universal Diet. Lond., 8vo, 1550.—*L. Cornaro*, De Vitæ Sobriæ Commodis. Padua, 4to, 1558.—*J. B. Champier*, De Re Cibaria, lib. xxii. Lugd. Bat., 8vo, 1560.—*G. Gratarotus*, De Regimine iter Agentium, lib. ii. Basil, 8vo, 1561.—*A. Fracantianus*, in Libro Hippocratis de Alim. Commentarius. Venet., 4to, 1566.—*M. Sybillinus*, De Medicam. Stomachicis quæ Ventriculi medentur Imbecillitatibus. Basil, 4to, 1580.—*B. A. Ferrioli*, Von den Magenschwachkeiten, &c. Insprug, 4to, 1590.—*B. Pisanelli*, Trattato della Natura de Cibi et del Bere. Venez., 8vo, 1596.—*T. Cogan*, The Haven of Health amplified on Five Words of Hippocrates—Labour, Meate, Drinke, Slepe, Venus. Lond., 4to, 1598.—*J. Bruyerinus* De Re Cibaria, lib. xxii. Francf., 12mo, 1600.—*E. Hollyngs*, De Salubri Studiosorum Victu. Ingols., 8vo, 1602.—*J. P. Surdus*, Tractatus de Alimentis. Lugd., fol., 1602.—*M. Zuccari*, De Vera et Methodica Nutriendi Ratione. Neapoli, 4to, 1602.—*J. L. Costæus*, Tractatus de Potu in Morbis. Pap., 4to, 1604; et de Facili Medicina per Seri et Lactis Usum, libri tres. Pap., 4to, 1604.—*P. Sismus*, De Dieta. Hagæ, 12mo, 1604.—*J. Quercitanus*, Dieteticon Polyhistoricon. Par., 8vo, 1606.—*J. Castalio*, De Frigido et Calido Potu. Rom., 4to, 1607.—*J. Sporisch*, De Ratione curandi Morbos per Bonam Dietam, lib. vi. Lips., 8vo, 1607.—*R. Goclenius*, De Portentosis Nostri Seculi Convivis. Marpurg, 12mo, 1609.—*A. Freitag*, De Esculentorum et Potulentorum Facultatibus. Gen., 18mo, 1614.—*J. Veraudæus*, De Morbis Ventriculi, lib. iii. Monspel., 8vo, 1619.—*A. de Bathingham*, Congressus Pomeridiani et Sermones Symposiaci, contra Cibi Potusque Intemperantiam. Col. Agr., 8vo, 1620.—*F. Scacchus*, De Salubri Potu. Romæ, 4to, 1622.—*P. Castellanus*, Κρεωφαγια, sive de Esu Carnitum, lib. iv. Antv., 8vo, 1626.—*J. D. Sala*, De Alimentis et eorum recta Administratione. Patav., 4to, 1628.—*J. Hart*, Κλινικη, or the Diet of the Diseased. Lond., fol., 1633.—*S. R. Castrensis*, Commentarius in Hippocrate de Alimento. Flor., fol., 1635.—*De la Chambre*, Nouvelles Conjectures sur la Digestion. Par., 4to, 1636.—*J. Freinshemius*, De Callida Potu Dissertat. Arg., 12mo, 1636.—*H. Mercurialis*, Excerpta de Potion. ac Edulis Antiquorum. Venet., fol., 1644.—*L. Nonnius*, Dieteticon, sive de Re Cibaria. Ant., 4to, 1646.—*M. Sebiz*, De Alimentorum Facultatibus, lib. v. Argent., 4to, 1650.—*V. Butæus*, De Calido, Frigido, et Temperato Antiquorum Potu. Rom., 1655.—*Th. Muffet*, Health's Improvement, or Rules of the Nature, &c., of all Kinds of Food. Lond., 4to, 1655.—*N. Culpepper*, Health for the Rich and Poor by Diet without Physic. Lond., 8vo, 1656.—*R. Short*, Περι ψυχροποσιας, of Water Drinking, against our Novelists, &c. Lond., 8vo, 1656.—*A. Deusingius*, Exercitationes de Nutrimenti Elaboratione. Gron., 12mo, 1660.—*B. Pisanelli*, De Alimentorum Facultatibus. Brüxelles, 12mo, 1662.—*C. Bennet*, Health's Improvement, or the Manner of preparing all Sorts of Food. Lond., 4to, 1665.—*B. Swalve*, Querelæ et Opprobria Ventriculi. Amst., 12mo, 1665.—*B. A. Ferrioli*, Morbosi Ventriculi Infelix hactenus Tentata Cura. Erf., 8vo, 1668.—*H. C. Kunse*, Dissertatio de Dyspepsia. Lips., 4to, 1679.—*G. Bartholinus*, De Cruditate Ventriculi. Hafn., 4to, 1665.—*T. Tryon*, On Cleanliness in Meats and Drinks. Lond., 4to, 1682; also, a good Housewife made a Doctor, teaching how to prevent and cure most Diseases by Diet and Kitchen Medicines. Lond., 8vo, 1682; and the Way to Health, Long Life, and Happiness, or a Discourse on Temperance. Lond., 8vo, 1683.—*J. N. Peschlin*, Theophilus Bibaculus, sive de Potu Thesæ. Kil., 4to, 1684.—*G. Viridet*, Tractatus de Primæ Coctione, &c. Genev., 8vo, 1691.—*L. Lemery*, Traité des Alimens. Par., 1702; translated by *Hay*. Lond., 12mo, 1745.—*C. Apicius*, De Opsoniis et Condimentis cum Annotat. *Martini Lister*. Lond., 1705.—*J. Weinewright*, A Mechan. Ac. of the Non-Naturals, &c. Lond., 8vo, 1707.—*C. B. Behrens*, Selecta Diet, seu de Recta ac Conven. ad Sanitatem Vivendi Ratione. Francfk., 4to, 1710.—*P. Hecquet*, De la Digestion et des Maladies de l'Estomac. Par., 8vo, 1712.—*J. Sedgwick*, A Treatise on the Use and Abuse of Liquors. Lond., 8vo, 1725.—*H. Ludulff*, De Apepsia, Dyspep. et Bradypepsia. Erford., 4to, 1727.—*J. Arbuthnot*, An Essay concerning the Nature of Aliments, &c. Lond., 8vo, 1731; and Pract. Rules of Diet. Lond., 8vo, 1732.—*G. Detharding*, Elementa Dietæ. Hafn., 12mo, 1732.—*W. Stephens*, Dolmus on the Cure of Gout by Milk Diet, to which is prefixed an Essay on Diet. Lond., 8vo, 1732.—*G. Cheyne*, An Essay on Regimen, &c. Lond., 8vo, 1739.—*A. Cocchi*, Del Vitto Pythagorico. Firenze, 8vo, 1743; transl. into Engl. Lond., 1745.—*S. Mason*, The Good and Bad Effects of Tea considered. Lond., 8vo, 1745.—*B. Robinson*, On the Food and Discharges of the Human Body. Dubl., 8vo, 1748.—*D. J. Ohrquist*, Dieta Ætatum. Ups., 1749.—*H. Shaneschuch*, Potus Coffeæ. Ups., 1749.—*T. Sucanson*, Panis Dieticus. Ups., 1749.—*E. Vigelius*, Dieta Acidularis. Ups., 1749.—*A. F. Wedenberg*, Varietas Ciborum. Ups., 1749.—*T. Short*, Discourses on Tea, Sugar, Milk, &c. Lond., 8vo, 1750.—*G. della Bona*, Dell' Uso e dell' Abuso del Café. Veron., 8vo, 1751.—*G. A. Pujati*, Riflessioni sul Vitto Pittagorico. Feltre, 4to, 1751.—*A. Zulatti*, Lettera sopra le Riflessioni del Signor *Pujati*. Venez., 4to, 1751.—*G. Bianchi*, Se il Vitto Pittagorico di soli Vegetabili sia Giovenole per Conservar la Sanita. Venez., 8vo, 1752.—*G. Odoardi*, Risposta alla Letters del Signor *Zulatti*. Trento, 4to, 1752.—*J. B. de Bonis*, Hydroposia, sive de Potu Aquæ in Morbis. Neap., 8vo, 1754.—*A. C. Lorry*, Essai sur les Alimens. Par., 12mo, 1754.—*C. C. Jahn*, Diätetik. Dresden, 8vo, 1760.—*A. Triboulet*, Quæsto Medica; an Secanda Vena in Indigestione? Douai, 4to, 1761.—*Linnæus*, De Potu Chocolatæ. Ups., 4to, 1765.—*F. de Valangin*, Treatise on Diet, or Management of Human Life, &c. Lond., 8vo, 1768.—*J. F. Zuckert*, Materia Alimentaria, in Genera, Classes, et Species Disposita. Berl., 4to, 1769.—*E. Harwood*, of Temperance and Intemperance, their Effects on the Body and Mind. Lond., 8vo, 1774.—*W. Falconer*, Observations on some Articles of Diet and Regimen usually recommended to Valetudinarians. Lond., 12mo, 1771.—*N. D. Falck*, Guardian of Health, Regimen, Diet, and Rules of Preserving Health. Lond., 8vo, 1779.—*J. Colombier*, Du Lait Considéré dans tous ses Rapports. Par., 8vo, 1782.—*P. B. C. Grasmann*, Diätetisches Wochenblatt Fuer Alle Stände. Rost., 8vo, 1783.—*L. Spallanzani*, Experiences sur la Digestion, par *Senebier*. Genev., 8vo, 1783.—*J. T. Plenk*, Bromotologia, seu Doctrina de Esculentis et Potulentis. Vien., 8vo, 1784.—*S. Ferris*, A Dissertation on Milk. Lond., 8vo, 1785.—*B. Carminati*, Richerche su la Natura e su gli Usi del Sugo Gastrico in Medicina e Chirurgia. Milano, 4to, 1785.—*L. J. M. Daubenton*, Mémoire sur les Indigestions Plus Frequentes à l'Age de 40 à 45 Ans. Par., 8vo, 1785.—*J. Rymer*, A Tract upon Indigestion and the Hypochondriac Disease. Lond., 8vo, 1785.—*M. W. Neufville*, Grundriss einer Abhandlung von der Sympathie des Verdauungssytems. Goett., 8vo, 1786.—*M. Petit Radel*, Essai sur le Lait Considéré Médicinalement Par., 8vo, 1787.—*T. Lardizabal*, Memoria Sobre las Utilidades de Chocolate. Pamplona, 8vo, 1788.—*C. J. Boehme*, Anleitung, die Vorzuglichsten Krankheiten der Ersten Wege Grundlich zu Heilen. Leips., 8vo, 1788.—*W. Stark*, Works of;

Clinical and Anatomical Observations, with Experiments, Dietetical and Statical, Ed. by *J. C. Smyth*. Lond., 4to, 1768. — *G. F. Hildebrandt*, Geschichte der Unreinigkeiten im Magem und den Gedärmen. Braunsch, 8vo, 1789.—*J. G. Reyher*, Allgemeine Pathologische Diät Order Lebensordnung für Kranke. Schwer., 8vo, 1790. — *G. Fordyce*, A Treatise on the Digestion of Food. Lond., 8vo, 1791.—*G. G. Richter*, Præcepta Dietetica, et de Materia Alimentaria. Bern., 12mo, 1791. — *C. Webster*, Facts tending to show the Connexion of the Stomach with Life, Disease, and Recovery. Lond., 8vo, 1793 (The original of *Abernethy's* system).—*G. C. G. Wedekind*, De Morborum Primarum Viarum Vera Notitia et Curatione. Nurub., 4to, 1792. — *G. A. Gramberg*, De Vera Notitione et Cura Morborum Primarum Viarum. Erlang., 8vo, 1793.—*R. Squirrell*, Essay on Indigestion and its Consequences. Lond., 8vo, 1795. —*F. Leonardi*, Dizionario Ragionato Degli Alimenti. Rom., 8vo, 1795.—*W. Buchan*, Observ. on the Diet of the Common People, recommending a less expensive and more wholesome Mode. Lond., 1797.—*R. Short*, On Drinking Water, and on Warm Drink. Lond., 12mo, 1799. — *A. F. M. Wilbich*, Lectures on Diet and Regimen. Lond., 8vo, 1799.—*E. Taylor*, Medical Remarks on Tea, Coffee, Tobacco, &c. Huddersf., 8vo, 1799. — *J. Tweedie*, Hints on Temperance and Exercise in the Cure of Dyspepsia, Rheumatism, &c. Lond., 8vo, 1799.—*W. Nesbit*, A Practical Treatise on Diet, &c. Lond., 8vo, 1801.—*G. Pearson*, Arranged Catalogues of the Articles of Food, Seasoning, &c. Lond., 8vo, 1801. —*L. Vogel*, Diätetisches Lexicon. Erf., 8vo, 1803.—*J. M. Adair*, An Essay on Diet and Regimen, &c. Lond., 8vo, 1804. — *A. Hunter*, Culina Famulatrix Medicinæ. York, 8vo, 1804.—*K. F. Burdach*, Die Diatetik für Gesunde, Wissenschaftlich Bearbeitet. Lips., 8vo, 1805. — *J. F. L. Albrecht*, Commentarius de Alimentis et Medicamentis. Gott., 4to, 1806. — *J. T. L. Danz*, Versuch Einer Allgemeinen Geschichte der Menschlichen Nahrungsmittel. Leips., 8vo, 1806. — *J. Abernethy*, Surgical Observations, part ii.; an Account of the Disorders of the Digestive Organs. Lond., 8vo, 1806.—*A. D. Stone*, A Practical Treatise on the Disorders of the Stomach, and of Digestion. Lond., 8vo, 1806.— *L. J. M. Daubenton*, Observat. on Indigestion, and on the Efficacy of Ipecacuanha. Lond., 8vo, 1807.—*G. Rees*, Pract. Observat. on Disorders of the Stomach. Lond., 8vo, 1807. — *J. Sinclair*, Code of Health and Longevity (4 vols.). Edin., 8vo, 1807. — *J. Robertson*, A Popular Treatise on Medical Police, and on Diet, Regimen, &c. (2 vols.). Edin., 8vo, 1809; also, a Popular Treatise on the Causes of Disease, with the Means of Prevention, Rules of Diet, &c. Lond., 8vo, 1811.—*Hallé* et *Nysten*, Dict. des Sc. Méd., t. i., p. 329. — *Barbier*, in Ibid., t. ix., p. 294. — *Fournier* et *Kergaradec*, in Ibid., t. x., p. 420.—*Meral*, in Ibid., t. xxiv., p. 347.—*R. M. Kastler*, De Alimentis Hominum Generatim Consideratis. Wien., 8vo, 1815.—*J. Ayre*, On the Nature and Treatment of Marasmus, &c. Lond., 8vo, 1818.—*M. Hall*, An Essay on the Mimoses. Lond., 8vo, 1820. — *J. Woodforde*, Treat. on Dyspepsia. Sherborne, 8vo, 1820.— *J. Ayre*, Practical Observations on Disorders of the Liver and Digestive Organs. Lond., 8vo, 1820. — *F. Accum*, A Treatise on Adulterations of Food. Lond., 8vo, 1820.—*J. Johnson*, On Derangements of the Liver, Internal Organs, and Nervous System. Lond., 8vo, 1820; and on the Morbid Sensibility of the Stomach and Bowels, &c. Lond., 8vo, 1827.—*Consterueh* and *Ebermaier*, Diätetisches Taschenbuch. Leips., 8vo, 1820. — *J. Tweed*, On Regimen and Diet. Lond., 12mo, 1820.—*J. J. Virey*, Histoire Naturelle des Alimens, &c. Par., 8vo, 1820.—*J. Fetler*, Handbuch der Diätetik. Landsh., 8vo, 1821.—*Rostan*, Dict. de Méd., t. i., p. 523; et t. vi., p. 587.—*W. Law*, On the Derangements of the digestive Organs. Edin., 8vo, 1821.—*J. Copland*, in Lond. Med. and Phys. Journ., vol. xlv., p. 362.—*W. Kitchener*, Peptic Precepts. Lond., 8vo, 1821. —*A. P. W. Philip*, A Treatise on Indigestion. Lond., 8vo, 1821; Appendix to this Treatise. Lond., 8vo, 1827.—*L. Meiner*, Die Heilung des Magenkrampfes und der Magenschwache. Leips., 8vo, 1822.—*J. C. Becker*, Versuch Einer Allgemeinen Nahrungsmittelkunde. Stendal, 8vo, 1822.—*T. Hare*, A View of the Structure, Functions, and Disorders of the Stomach. Lond., 8vo, 1823. — *W. Shearman*, History and Treatment of Chronic Debility, the Prolific Source of Indigestion. Lond., 8vo, 1824. — *C. T. Thackrah*, Lectures on Digestion and Diet. Lond., 8vo, 1624. — *K. L. Close*, Grundsätze der Allgemeinen Diätetik. Leips., 8vo, 1825. — *Leuret* and *Lassaigne*, Récherches Physiques et Chymiques sur la Digestion. Par., 8vo, 1825.—*Reige-Delorme*, Dict. de Médecine, t. xii., p. 104.—*F. Richter*, Die Heilung der Krankhaften Verdauung in dem Mittleren Lebensalter. Quedl., 8vo, 1825. — *J. A. Paris*, On Diet and Disordered States of the Digestive Functions. London, 8vo, 1826. — *Tiedemann* et *Gmelin*, Recherches Experim. Physiol. et Chim. Sur la Digestion, &c., 2 vols., 8vo. Paris, 1827.—*J. Thomas*, On Chronic Affections of the Digestive Organs. Chelt., 8vo, 1827.—*D. Uwins*, On Diseases connected with Indigestion, &c. Lond., 8vo, 1827. — *W. Cullen*, Practice of Physic, by *J. Thomson*, vol. ii., p. 368. Edinb., 1827.— *W. Cooke*, An Inquiry into the Sources and Effects of Derangements of the Digestive Organs. Lond., 8vo, 1828.— *Hohnbaum*, Encycl. Wörterb., b. iii. Berl., 1829.—*Londe*, Dict. de Méd. Pract. (Art. ALIMENT), tom. ii.; and *Jolly*, in Ibid., tom. vi. (Art. DYSPEPSIA).—*S. W. Avery*, On Dyspepsia. New-York, 8vo, 1830.—*J. Abercrombie*, On Diseases of the Stomach and other Abdominal Viscera. Edinb., 8vo, 1830.—*T. Mayo*, Essay on Temperament, as modifying Dyspepsia. Lond., 8vo, 1831. — *J. A. Paris*, in Cyclopæd. of Pract. Med. (Art. DIETETICS); and *T. J. Todd*, in Ibid. (Art. INDIGESTION). Lond., 1832.—*Bouillaud*, in Dict. de Méd. Prat. (Art. INDIGESTION), tom. x. Par., 1833. — *W. Beaumont*, Experiments and Observations on the Gastric Juice, and the Physiology of Digestion. Plattsburg, 8vo, 1833.—*J. M. Good*, Study of Medicine, by *S. Cooper*, vol. i., p. 137.—*W. H. Robertson*, A Popular Treatise on Diet and Regimen, intended as a Text-book for the Invalid and the Dyspeptic. Lond., 8vo, 1835.—*C. Ticknor*, The Philosophy of Living, or the Way to enjoy Life and its Comforts. New-York, 8vo, 1836. — *A. Combe*, the Physiology of Digestion considered with Relation to the Principles of Dietetics. Edinb., 8vo, 1836. — *S. Smith*, The Philosophy of Health, &c. Lond., 8vo, 1837.—*J. Johnson*, The Economy of Health, &c. Lond., 8vo, 1837.—*H. Mayo*, Management of the Organs of Digest. in Health and in Disease. Lond., 8vo, 1837; also, the Philos. of Living. Lond., 8vo, 1838.

[AM. BIBLIOG. AND REFER.—*Hence Jones*, On Gravel, Calculus, and Gout. Lond., 1842. — *J. Liebig*, Animal Chemistry, or Chemistry in its Application to Physiology and Pathology, Ed. by *W. Gregory*, M.D., 2d ed., 12mo. New-York, 1842. — *J. Bostock*, System of Physiology, 4th ed. Lond., 1844.—*W. B. Carpenter*, Principles of Human Physiology, with their chief Applications to Pathology, Hygeine, and Forensic Medicine, Am. Edit. Phil., 1844, with Notes, by *Dr. Clymer*; et Princ. of General and Comp. Physiol.; et Animal Physiology. Lond., 1843.—*C. Chossat*, Recherches Experimentales sur l'Inanition, 4to. Paris, 1843. —*A. Combe*, Physiology of Digestion considered with reference to the Principles of Dietetics, 18mo. N. York, 1836; et Princ. of Physiology, &c. N. Y., 18mo, 1844. — *J. Cruveilhier*, Anat. Pathologique du Corps Humain, &c., 1841. —*Levraisons*, 1 vol., 125 coloured Plates. Paris, 1842. — *W. Davidson*, A Treatise on Diet, comprising the Natural History, Properties, Composition, Adulterations, and Uses of the Vegetables, Animals, Fishes, &c., used as Food, 1 vol., 8vo. Lond., 1843.—*R. Dick*, Derangements, Primary and Reflex, of the Organs of Digestion, 8vo. Phil., 1842. —*J. Elliotson*, The Principles and Prac. of Med., Am. Ed. by *J. Stewardson*, 1 vol., 8vo. Phil., 1844. The Useful Arts employed in the Production of Food, 1 vol., 12mo. Lond., 1844.—*Hufeland*, Enchiridion Medicum, or Manual of the Pract. of Med., transl. from the German, 8vo. N. Y., 1843.—*J. Johnson*, The Economy of Health, 18mo. N. Y., 1840. Library of Pract. Med.; Cyclopædia of Pract. Med., Am. Ed., 1844. — *S. G. Morton*, Am. Ed. of *Mackintosh's* Prac. Med. Phil., 1844.—*H. Mayo*, The Philosophy of Living. Lond., 1838.—*S. Morewood*, A Phil. and Statistical History of the Use of Intoxicating Liquors, 8vo. Dub., 1838. — *B. Parsons*, Anti-Bacchus. Lond. and N. York, 1840. — *J. Pereira*, On Food and Diet, Ed. by *C. A. Lee*. N. Y., 8vo, 1843.—*W. Prout*, On the Nature and Treat. of Stomach and Urinary Dis., 4th ed. Phil., 1845. — *G. Sigmond*, Tea, its Effects, Medicinal and Moral, 1 vol. Lond., 1840.—*Basil Montague*, Some Inquiries into the Effects of Fermented Liquors, 3d ed., 8vo. Lond., 1841. — *M. Truman*, Food, and its Influence on Health and Disease, 12mo. Lond., 1842.—*S. Watson*, Lectures on the Principles and Practice of Physic. 2 vols., 8vo. Lond.; 1 vol., Am. Ed. Phil., 1844. — *C. Wightman's* Treat. on the Digestive and Nervous Systems. Lond., 1840.—*S. Graham*, Lect. on the Science of Human Life, 2 vols., 12mo. Boston, 1838.—*D. Olliver*, Elements of Physiology. — *R. Dunglison*, in Elements of Hygiene, or Human Health, and in Am. Quarterly Review; Human Physiology, 5th ed. Phil., 1844; Practice of Medicine, &c., 2d ed., 2 vols. Phil., 1844. — *M Paine*, Med. and Physiological Commentaries, 2 vols., 8vo. N. York, 1842. — *W. Beach*, The Am. Prac. of Medicine, &c., 2 vols., 8vo. N. York, 1836. — *W. Beaumont*, Experiments and Observations on the Gastric Juice and the Physiology of Digestion, 1 vol., 8vo. Plattsburg, 1833. — *W. Burke*. The Mineral Springs of Western Virginia, with Remarks on their Use and the Diseases to which they are liable, 18mo. N. Y., 1842. — *A. Sidney Doane*, Am. Ed. of *Good's* Study of Medicine, 2 vols., 8vo. N. York, 1839.—*J. Eberle*, Notes of Lect. on the Theo. and Prac. of Med., 12mo. Phil., 1840. Treatise on the Pract. of Med., 5th ed., 2 vols. Phil., 1841.—(Dr. *B. W. Dwight*, to whose able Essay we have already referred (On Chronic Debility of the Stomach, in Am. Acad. of Arts and Sciences, vol. i., part ii. New-Haven, 1811), has pointed out, with very great clearness, the causes, symptoms, and indications of treatment in this disease, and the best mode of fulfilling them. Labouring for years under an aggravated form of the affection, he was enabled, from his own experience, to describe the *laedantia* and *juvantia* with remarkable clearness and particularity.)—*N. Chapman*, Lectures on the more important Diseases of the Thoracic and Abdominal Viscera. Phil., 1844; and in Am. Journ. Med. Sci., vol. XXV., XXVI.—

John Bell and *W. Stokes*, Lectures on the Theory and Practice of Physic, 3d ed., 2 vols. Phil., 1845; et Am. Ed. of *Müller's* Physiology. Phil., 1844. On Regimen and Longevity, comprising Material Aliment and National Dietetic Usages, and the Influence of Civilization on Health and the Duration of Life. Phil., 1842.—*S. W. Avery*, The Dyspeptic's Monitor. N. York, 1833.—*C. A. Lee*, Human Physiology, 1 vol., 12mo. N. York, 1838; Am. Ed. of *Pereira* on Food and Diet. N. York, 1843; Am. Ed. of Bacchus, by *R. B. Grindrod*. N. Y., 1840.—*John Revere*, A Summary of Physiology, translated from the French of *F. Magendie*, 1 vol., 8vo. N. York, 1844.—*Edward Hitchcock*, Dyspepsia Forestalled and Resisted. Amherst.—*J. Root*, The Horror of Delirium Tremens, 8vo. N. Y., 1844.—*T. Sewall*, The Pathology of Drunkenness, or the Phys. Effects of Alcoholic Drinks, with coloured Drawings of the Drunkard's Stomach, 4to. Albany, 1841.—*J. Thacher*, Am. Med. Prac., 1 vol., 8vo. Bost., 1826.—*C. Tickner*, The Philosophy of Living, or the Way to enjoy Life and its Comforts, 18mo. N. Y., 1842.—*W. P. Dewees*, Practice of Physic, 2d ed., 8vo. Phil., 1833.—*W. W. Gerhard*, *R. J. Graves*, Clinical Lectures, 2d ed., 1 vol., 8vo. Phil., 1842.—*D. Hosack*, Lectures on the Theory and Pract. of Phys., Ed. by *Ducachet*. Phil., 1838.]

INDURATION.—Synon. *Induratio* (from *Indurare*), to become hard. *Induration, Endurcissement*, Fr. *Induramento*, Ital. *Die Härtung; verhärtung*, Germ. *Hardening*.

Classif.—General Pathology.—*Morbid structure—Therapeutics*.

1. Induration is either *physiological* or *pathological*. The former proceeds, *first*, from the changes which take place in the tissues during the progress of Age (see that article); and, *secondly*, from the increased nutrition and vital cohesion consequent upon great activity of the vital manifestations of the part. This latter state, however, can hardly be termed induration. The *general pathological relations of induration* only require notice at this place. The specific conditions of it in the different tissues and organs are noted in the articles on the pathology of these parts.

2. i. Induration may exist in a *simple state*, and unconnected with any apparent deposition of fluid or morbid product. In this case it is merely a greater density of the natural structure, owing to some change in its nutrition, without any morbid secretion or farther lesion of organization. Various tissues and organs occasionally present this alteration, as the brain, the liver, the muscular structure of the heart, the cellular and fibrous tissues, the bones, the glands, pancreas, ovaries, &c. It may be independent of any change in the size or form of the part; but it is often connected with an increase of size, constituting *hypertrophy with induration*.

3. ii. Induration may depend upon an *infiltration of a fluid or solid matter* into the areolar or peculiar structure of a part—of serum, lymph, albumen, fibrin, or even of blood. The excited, or otherwise altered action of the capillaries of the part may give rise to the effusion of these matters in a more or less fluid state; but they subsequently undergo various changes as to consistence or even organization, their watery parts being absorbed, and the albuminous or fibrinous portions becoming more or less changed, or even identified with the structures which they infiltrate. Many of the lesions observed in the cellular tissue and parenchymatous organs—in the lungs, liver, spleen, glands, &c.—are owing to this species of alteration.

4. When the matter thus deposited is of a *peculiar or adventitious nature*, whether pre-existing in the blood, or produced by a change in the vital condition of the part, or of the constitution, the tissues, which are the seat of induration, undergo a succession of changes, and they, as well as the matter which infiltrates them, or is deposited in them, assume peculiar forms, as in scirrus, cancer, &c.

5. iii. Induration may proceed from the *absorption of the more fluid constituents of the tissues*. This seldom occurs, excepting from compression, owing to the effusion of fluid, or the development of morbid structures in their vicinity, or in enveloping parts. Effusions in the pleura and false membranes formed on its surface produce this change in the lungs; and the fibrous or fibro-cartilaginous formations in other situations produce a similar alteration, as in the spleen, &c. This form of induration may often be said to be rather a state of condensation or atrophy with induration. The distention produced by the accumulation of natural secretions cannot be comprised among the forms of induration.

6. iv. Indurated parts *vary in appearance*, in colour, size, and form. 1. The *colour* is generally changed, being often pale, owing to diminished vascularity and the deposite of albuminous matter; and sometimes red, grayish brown, yellowish, &c. These hues evidently depend upon the vascularity and the state of stagnant fluids, and of effused or infiltrated matters. 2. The *size* of indurated parts may not be changed; more frequently it is increased, and sometimes it is diminished. 3. The *form* of the indurated part may or may not be altered.

7. v. The *causes* of induration may, in general terms, be stated to be whatever excites the vital actions of the part, or occasions a slight or protracted irritation of its capillaries. Induration from compression, however, cannot be ascribed to these causes. M. Andral remarks that, I. Irritation may be the first phenomenon apparent, evidently preceding irritation, and continuing with it. 2. Irritation, having produced induration, may cease, induration alone continuing. 3. Induration sometimes occurs without any evidence of pre-existing irritation. 4. At an advanced period of induration, the quantity of blood sent to the part is actually less than before its induration, its vitality being also less than before this change of structure. 5. In some cases, a secondary irritation may arise, at a longer or shorter period, after the formation of induration. This secondary irritation sometimes restores the indurated part to its healthy condition; but more frequently it is productive of the most injurious consequences, causing ulceration, softening, &c.

8. vi. Treatment.—Induration in vital organs can seldom be ascertained so as to enable the physician to enter upon its treatment with much hope of success. Alterations of sensation, motion, and size sometimes lead to a belief in its existence. When these exist with weight or tension, and marked disturbance of function, vascular depletion, general or local, according to circumstances, derivatives and courses of alteratives, are the chief means upon which reliance can be placed. The alkaline solutions, the preparations of iodine, and mild mercurials, with narcotics, are sometimes useful; and the various modes of deriving irritation to external parts should not be neglected. But both alteratives, deobstruents, and derivatives ought to be continued for a sufficient time to test their efficacy. When the indurated

part is near the surface, deobstruent plasters, and frictions with discutient liniments, embrocations and fomentations, may be severally employed. In all cases, it is necessary to prevent disorder of the digestive organs, to allay pain and irritation by anodynes, to promote the natural secretions and excretions, and to preserve the constitutional powers by light nourishment and change of air. When induration proceeds from compression, the removal of the compressing cause should be attempted, if circumstances admit of its accomplishment.

Biblioo. and Refer.—*Pranser*, De Indurationo Corporis, in Specie Ossium. Lips., 1705.—*Hoernigk*, De Indurationo Partium Prematura. Lips., 1750.— *De Haller*, De Induratis Corporis Humani Partibus. Goet., 1753.—*Loesecke*, Observ. Anat., n. 3. — *Marteau de Grandvilliers*, in Journ. de Médecine, tom. ix., p. 49.—*Richter*, in Comment. Soc. Sc. Gôtting., vol. xv., p. 33. — *Weitz*, in *Hufeland*, Journ. der Pr. Heilk., b. xvi., st. 2, p. 39.—*G. L. Bayle*, in Ed. Med. and Surgical Journ., vol. ii., p. 401. — *Andral*, Pathological Anatomy, translated by *R. Townsend* and *W. West*. Dublin, 8vo, 1829, vol. i., p. 244.—*Otto*, Pathological Anatomy, translated by *South*. Lond., 8vo, 1831, p. 39. —*Rochoux*, in Dict. de Médecine, tom. xii., p. 114. —*J. J. Virey*, in Dict. des Sc. Méd., tom. xxiv., p. 365. —*R. Carswell*, in Cyc. of Pract. Med., p. 671. Lond., 1832.

[Am. Biblioo. and Refer.—*S. D. Gross*, Elements of Pathological Anatomy, 2 vols., 8vo. Bost., 1839.]

INFECTION.—Syn. From *Inficio. Contagium, Conterges, Contagio*, from *con* and *tango*, Lat. *Infection, Contagion*, Fr. *Ansteckung, Infezione, Contagione*, Ital. *Contagion*.

Classif.—General Pathology—*Etiology*.

General Therapeutics—*Prophylactics*.

1. In the view which I am about to take of infectious agents, of their operation, and of their effects, it will be necessary to premise a few remarks as to the meaning I would attach to the word *infection*, as well as to other terms which have been usually considered as synonymous with it, or as expressing modes of the same agency. By some writers, the words *infection* and *contagion* have been received as altogether synonymous, while others have drawn distinctions between them. Few, however, of the latter have agreed on the subject. Quesnay first attempted to give precision to the application of these terms, but with little success. Since his time the word *infection* has been commonly applied to the communication of disease from the sick to the healthy, by a morbid miasm or exhalation diffused in the air; and the word *contagion* to the transmission of a specific malady by immediate or mediate contact. But it is obvious that these are merely modes of the same agency in the majority of instances; for the humidity of the air becomes a medium of contact in the former, as much as the clothes of the sick are the media of it in the latter, the chief difference being that the one acts only by being diffused in the air, while the other may act either in the same way, or it may directly convey a consistent virus or morbid secretion. In cases where substances have become the media of absorbing and retaining the morbid emanations or the effluvia of specific diseases, and thereby transmitting them, it must not be inferred that the infection is produced by contact of any part of the external surface of the healthy person with the substance thus imbued. The clothes worn by a person while labouring under a disease strictly contagious, even according to the above acceptation, may be so imbued with the morbid exhalation as to retain it for a long time, especially if shut up from the air, and may afterward emit it upon being unfolded and exposed, and thereby propagate the disease to an individual who has never come in contact with the substance which has thus proved the *fomes* of contagion. Instead, therefore, of considering these distinctions as constituting a true difference, it will be preferable to view *contagion* as a *mode* of infection, to which certain limitations should be attached.

2. M. Rochoux considers that infectious agents may be divided into those which, like germs, are capable of reproducing and multiplying themselves as organized bodies, and into those which are devoid of this character, and require for their propagation certain accessories, without which they will not appear. The former of these represent contagions, the latter infections. M. Dupuytren observes that *infection* is the contamination of the air by persons confined in low, close, ill-ventilated, and dirty situations, and by vegetable and animal substances undergoing decomposition, the emanations with which the air is thereby charged acting on man as poisonous agents. The sources of these emanations are active in proportion to the grade of atmospheric humidity and temperature, and to the nature and quantity of the miasms which the air contains. *Contagion*, on the other hand, he considers to be in many respects independent of atmospherical conditions, and a species of germ or virus developed in the bodies of the sick, or forming an atmosphere around them containing the principle of the malady; and through the medium of this germ, virus, or morbid principle the malady is transmitted to the healthy. When we consider the diverse states and kinds of agents to which the terms infection and contagion have in general been indiscriminately applied, and the close approximation of several of these agents to each other, as respects their properties and effects on the living economy; and when we farther consider the modifications each of them experiences in the ever-varying conditions in which they present themselves, and from the several circumstances and accessory influences which are associated with them, the difficulty of assigning to them specific distinctions will be evident. Yet the difficulty should not preclude attempts at distinctions, and at arrangements founded on such distinctions, as a greater precision of knowledge than now exists will, to a certain extent, result even from a partial attainment of these objects, and will be extremely conducive, not only to an acquaintance with the influences by which these agents are modified, and with the changes they effect on the human economy, but also to the suggestion and acquisition of means by which their effects will be prevented, or be counteracted where prevention cannot be accomplished. The chief fault of distinctions drawn between *infection* and *contagion*, and at the arrangement of the various modes and kinds of these agencies is, that both the one and the other are based upon preconceived and narrow views of their nature and operation, involving, moreover, various opinions by no means consonant with the usual procession of morbid actions. The obvious course, therefore, is to make distinctions only where differences actually exist, applying terms with precision, according either to their received meaning or to the sense in which it is desired to receive them,

and to arrange phenomena according to the relations established by close observation and candid description. In the following remarks I use the word *infection* in its *generic* acceptation, employing it according to the meaning attached to it by VIRGIL, OVID, PLINY, and other classical writers of antiquity, and by many modern authors; and applying it to whatever may effect, so as ultimately to *taint, pollute,* or *corrupt the body.* I use also the word *contagion* in the sense imposed on it by VIRGIL, PLINY, COLUMELLA, and CURTIUS—as an *infection by immediate or mediate contact*—as a *pollution by the touch.* The word *contamination* may with justice be applied to the deterioration or morbid change which takes place in the fluids of the body during the course of infectious maladies. The terms *morbid impression* and *morbid influence* will represent the change first produced, particularly on the nervous system, by the agents of infection. Although the effluvia or emanations from the sick, the secretions formed in the course of infectious diseases, and the putrid fluids in the bodies of the dead, generally act upon the living, when applied in a manner suited to the operation of each, as *animal poisons,* yet I will restrict this term to those agents which are usually thus designated.

3. From this it will appear that the word *infection* is here employed in its most extensive application, and that the words *contagion, contamination, morbid impression,* or *influence* are used to express the chief modes in which it takes place, and the chief states in which it may exist. Receiving, therefore, *infection* as the generic appellation, the other terms represent *species* arranged under it. In other words, the frame may be infected, 1st, by the *morbid impression* of agents—*internal* or *self-generated,* or *external and mephitic,* the infection being limited to the individual, and incapable of propagating its kind. 2dly, by the *contamination* produced by animal effluvia, the infection being capable of propagating itself in certain ascertained circumstances, and of spreading to the healthy from those affected by these agents. 3dly, by the *morbid impression* or *contamination* of specific emanations and secretions, the infection presenting certain specific effects, or disseminating and perpetuating specific maladies.

4. The various influences and agents by which the human frame is infected throughout come under one or other of these modes of operation. They consist chiefly of miasms or exhalations from vegetable matters in a state of decay; of unwholesome or noxious ingesta; of effluvia from dead animal matter; of the emanations from the healthy in confined situations, and from the sick in several diseases, and in the various circumstances favourable to their accumulation or concentration; of septic matters arising from animal decay; and of palpable or more or less consistent secretions. But several infectious agents may be associated in their operation. The miasms or exhalations from decayed vegetable matter, or from the soil, &c., may be conjoined with the effluvia from animal substances. Some of them may act directly, or in the vicinity of their sources only, as those derived from vegetable and animal decay. Others not only operate in this way, but also through the medium of substances which imbibe and retain them in a sufficient quantity to be injurious. They admit, however, of certain general propositions being stated with respect to them; and of the following arrangement, with reference both to their nature and effects:

a. Infecting agents consist almost entirely of decayed or diseased organized substances, and of animal emanations or secretions.

b. Those agents which proceed from the decay of vegetable substances or principles, although they infect the frame exposed to their sources, are yet incapable, when unaided, of producing those states of action generating a seminium, or morbid principle by which they may be propagated from the sick to the healthy.

c. Organic bodies in a state of decay or disease, and animal secretions, *infect* the human frame chiefly during states of predisposition or susceptibility of the frame, certain only of which states are ascertained.

d. The *morbid actions* produced by infectious agents generally assume specific forms according to the nature of the agent, so that the agent being known, its effects may be predicated; and on the other hand, the nature of the agent may be inferred from the form and characters of the existing effect.

CLASSIFICATION OF INFECTIOUS AGENTS.

Class of Agents.	*Order of Agents.*	*Species of Agents.*	*Diseases resulting therefrom.*
I. NON-DISSEMINATING AND NON-PERPETUATING INFECTIONS. *Idio-infectants.*	i. *Miasms or mephitic vapours — Endemic Infection—acting through the air.*	1. Miasms from decayed vegetable matter aided by moisture, in temperate ranges of atmospheric heat.	Catarrhal fevers. Rheumatic attacks. Intermittents. Enlargements of the spleen, and torpid states of the liver.
		2. Exhalations from absorbent, or deep, exuberant, or marshy soils, suspended in atmospheric humidity at temperate grades of warmth.	Intermittents. Remittents. Simple dysentery. Simple cholera. Bilious fevers. Obstructions and other diseases of the liver and glandular organs.
		3. Miasms or vapours from decayed vegetable matter, or from marshes and rich, deep, and humid soils at high ranges of temperature.	Inflammatory, bilious, and gastric fevers of both a remittent and continued type. Diseases chiefly of the abdominal viscera.
	ii. *Unwholesome and poisonous ingesta* — Infections occasionally epidemic.	Unripe, diseased, or decayed grain. Diseased or putrid fish or flesh. Water containing putrid animal matters, &c., &c., &c.	Ergotism. Gangrenous ergotism. Asthenic and chronic diarrhœa. Dysentery. Scurvy and scorbutic dysentery. Mucous, gastric, and putro-adynamic fevers.
	iii. *Self-contaminating agents,* or morbid matters formed in a part, afterward contaminating the system generally.	1. Cancer. Fungo-hæmotoid disease, &c.	The carcinomatous and fungo-hæmatoid cachexy.
		2. Purulent, sanious, or other morbid secretions carried into the circulation.	Acute hectic. Low remittent, and adynamic states of fever, often attended by phlebitis or purulent deposites in the viscera or joints.

Class of Agents.	Order of Agents.	Species of Agents.	Diseases resulting therefrom.
II. Conditionally perpetuating Infections—Contaminating Infections.	i. *Animal effluvia*—Producing diseases propagating the same or similar maladies in favourable circumstances. *Conditionally and consecutively infectious*, chiefly by means of diffusive and impalpable emanations.	1. Effluvia from animal matter, or from vegeto-animal matters during decomposition, aided by humidity.	Adynamic or pernicious remittents. Continued fevers. Adynamic dysentery. Cholera. Gastric, mucous, or enteric fevers.
		2. Emanations from living bodies in close or unventilated situations.	Adynamic, putro-adynamic, and malignant fevers. Malignant dysentery.
		3. Emanations from the secretions and discharges of the sick confined in close apartments, &c., and the direct application of these secretions.	Erysipelas. Hospital Gangrene. Phlebitis. Puerperal fever.
	ii. *Animal secretions and septic animal matters.*—Infectious chiefly by contact, or inoculation of a palpable matter; *chiefly sporadic.*	1. Morbid secretions in recently dead bodies.	The irritative fever, or malignant effects produced upon opening recent bodies, by the morbid secretions poured out in serous cavities.
		2. Animal matter in a state of putridity or decomposition.	Diffusive or disorganizing inflammation of cellular parts. Inflammation of lymphatics of veins, &c.
		3. Morbid secretions communicated from the lower animals by contact or inoculation.	Glanders. Farcy malignant pustule and other affections arising from contaminating diseases in the lower animals.
		4. The poisonous bites of insects and reptiles.	General vital depression, and septic disorganization, or solution of the vital cohesion of the tissues.
III. Specific Infections.—Infections immediately or mediately disseminating and perpetuating their kinds, by a morbid impression, or by contamination, or by both. Capable of retention and communication by Fomites.	i. *Impalpable specific infections* of susceptible persons. Diffusive or volatile infections, frequently epidemic.	Emanations from the secretions, excretions, and surfaces of persons already affected. Propagating their kind by a diffused and impalpable effluvium or vapour.	Epidemic and exanthematic typhus. True yellow fever. Pestilential cholera. Pertussis.
	ii. *Palpable specific contagions.* Consistent contagions.	A specific secretion or virus from the seat of disease perpetuating maladies always presenting the same characters.	Rabies. Syphilis. Gonorrhœa. Scabie. Yaws. Sivvens. Frambœsia. Purulent, or Egyptian Ophthalmia. Cowpox. Pellagra. Porrigo.
	iii. *Infections both diffusive and consistent.*—Often epidemic.	Diffusive and impalpable emanations, and consistent secretions from the bodies of the infected, either of which may produce the same disease.*	Chicken-pox. Scarlet fever. Smallpox. Measles. Malignant puerperal fever. Plague.

* [Under the article "*Epidemics*" (vol. i. sec. 48, p. 895) we have alluded to the classification of contagions as arranged by the late David Hosack. Previous to giving this, however, it should be remarked that Dr. R. Bayley, of New-York, in his account of the yellow fever, which prevailed in that city in 1795, proposed a distinction between *contagious* and *infectious* diseases; making use of the first term to denote such as are communicated under any circumstances of atmosphere, whether pure or impure, as smallpox, measles, &c., and calling those diseases *infectious* which are communicated in consequence of an impure or vitiated state of the atmosphere. In other words, he believed that the *impurities* of the atmosphere communicated the disease, not that the air contains any *specific material* derived from the patient, except such as may be occasioned by the want of cleanliness; although Dr. Hosack regarded this distinction of Dr. Bayley as a nearer approach to the truth than had been previously made, but as not expressing the whole truth upon the subject; "for," says Dr. H., "the visiter or attendant contracts disease from one of *two sources*, either from the filth of the sick-room, or from a *specific something* issuing from the body of the sick, the consequence of the peculiar disease under which he labours. If a person visiting another ill of the yellow fever or plague derive his disease from the impure atmosphere of the apartment, I ask how it happens that in all instances he contracts the same disease with that of the person whom he visits? Why is his disorder not an intermittent, a remittent, jail fever, or dysentery, which are considered the usual produce of filth? If he derive anything specific from the sick, his disease is then assuredly not to be considered as occasioned by the atmosphere, but depending on the peculiar condition of the fluids or state of the system, induced by the action of a specific poison; in other words, it is to be considered a *contagious* disease.

"The distinction proposed by Dr. Bayley, inasmuch as it does not account for the communication of the *peculiar form* of fever or disease which is thus propagated, I therefore consider to be insufficient to account for the circumstances attending the communication of those diseases to which it is applied. That I may not be misunderstood, I will suppose A to be ill of *dysentery*, a disease well known to be attended with a *peculiar train of symptoms*; he is in a small, confined apartment, his person is neglected, the atmosphere around him is rendered impure and offensive: under these circumstances, B visits him, and a few days after is also taken sick with the *same disease*, attended in all respects with the *same* dangerous symptoms which characterize the disorder of A. Dr. Bayley, and those who adopt the doctrine of *infection* as opposed to *contagion*, considered the disease of B to proceed from the *impurities of the chamber*, and not from anything *peculiar* emanating or secreted from the body of A. But as we may, without hazard, visit an equally filthy chamber where C lies ill of *cholera morbus*, or D with a *broken limb*, I therefore ascribe the disease of B to something more than the *impure air* of the chamber of A. I ascribe it to a *peculiar virus* generated in his system by the disease under which he labours, and communicated by his excretions to the surrounding atmosphere, rendering it thus capable of producing the same disease in those who may be exposed to its influence.

"The communication of this virus from the sick to the well, in whatever form it may be conveyed, as uniformly produces the *same disease* as *inoculation* excites the *smallpox*, *vaccination* conveys the *vaccine virus*. So far, then, there is something in *common* in the communication of contagious or infectious diseases, which should be accordingly expressed in the language we employ; some of those diseases are conveyed in one form, others in a different: we should then be equally careful to mark those circumstances in which they *differ*, as well as those which they possess in common.

"Such an arrangement appears to me not only practicable, but, at the same time, calculated, in some degree, to harmonize the differences of opinion which now separate the contagionists and non-contagionists. Under these impressions, I propose to arrange those diseases which are communicable from one to another under three heads. First, those which are communicated *exclusively* by *contact*. In this class I enumerate the itch, syphilis, the laanda of Africa, frambœsia, or yaws, elephantiasis, or leprosy, hydrophobia, and the vaccine virus.

"Neither of these diseases can be communicated in any other way than by *contact*; they are, therefore, *contagious* diseases in the strict etymological sense of the term. It is also to be remarked that these diseases are never conveyed through the medium of the *atmosphere*; actual contact alone can communicate them from one person to another.

"These diseases, acknowledged by all to be contagious, and so denominated by all writers, have a law of communication peculiar to themselves. But there is a second class of diseases also considered as contagious, which are communicated under different circumstances, governed, in this respect, by different laws of communication.

"Those to which I now allude are such as are communicated both by *contact* and by the *atmosphere*. In this class I arrange smallpox, measles, chicken-pox, hooping-cough, scarlet fever, and cynanche maligna.

"Contact, or the *close approach* to the sick labouring under these diseases, will communicate them to those who are susceptible of their influence; but they are no less communicable through the *medium of the atmosphere*. A *second law* which governs the communication of this class of contagious diseases is, that they are communicable in *every*

5. I. The Sources of Infection.—According to the extensive sense in which I have employed the term infection, its sources or agents are numerous and diversified. They may be

season, in the heat of *summer*, as well as in the cold of *winter*—in a *pure* as well as in an *impure* air, though more readily by the latter than the former. A *third law* of communication in this class of diseases is, that the persons afflicted with them are not generally susceptible of a second attack. I say *generally*, because exceptions are related upon very respectable authority.

"This second class of contagious diseases is, therefore, abundantly distinguished from the first; but they are still associated by most medical writers under the same head of contagious diseases, without assigning to each class its discriminating characters.

"The same want of discrimination has, in my opinion, occasioned the numerous disputes among physicians relative to the contagiousness and non-contagiousness of those fevers which I enumerate as the *third class* of diseases that are communicable from one person to another. Under this head I arrange plague, yellow fever, typhus, *jail, ship, hospital, or lake fever*, and dysentery.

"These diseases are only, in general, communicable through the medium of an *impure* atmosphere; in a pure air, in large and well-ventilated apartments, when the dress of the patient is frequently changed, all excrementitious discharges immediately removed, and attention paid to cleanliness in general, these diseases are not communicated, or very rarely so, from one to another. But in an *impure* air, rendered so by the decomposition of animal and vegetable substances, as takes place in low, marshy countries, or by concentrated human effluvia, as in camps, jails, hospitals, or on shipboard, they are rendered not only extremely malignant and mortal in themselves, but become communicable to others who approach the sick, or breathe the same atmosphere, which has become *assimilated* to the poison introduced, insomuch that *the same specific disease* is communicated, whether it be the *plague, yellow fever, typhus*, or *dysentery*.

"Hence we account for the fact stated by Sydenham and other writers on epidemics, that the prevailing disease swallows up all other disorders, *i. e.*, that during the prevalence of an epidemic plague, typhus, dysentery, or other diseases of this class, every indisposition of a febrile sort readily assumes the character of the prevailing disorder. We know this to be experienced in the diseases of other countries, and we see it daily exemplified in our own: both in our cities and in the country towns, when, after heavy showers of rain and the action of a hot sun, a decomposition of vegetable and animal substances takes place, and dysentery or typhus fever is produced, it assimilates the air to itself, whatever may be the acting poison. But under other circumstances of weather and season, the disease thus originating from some local circumstances, or from a peculiar habit of body in the person so affected, does not extend beyond the family in which it first occurred, or, perhaps, the individual in whom it originated.

"This class of diseases, therefore, like the former, has a law peculiar to itself; *i. e.*, the diseases composing it are communicable, or otherwise depending upon the *condition of atmosphere* in which they occur or are introduced, whereas those of the second class are conveyed from person to person through a *pure* as well as an *impure* medium; but they, also, are rendered more virulent and malignant in an atmosphere charged with miasmata than in that which is free from such ingredients.

"It is also, I believe, generally true of the diseases of the *third class*, not, perhaps, excepting the *plague* and *yellow fever*, that they may be taken a *second time*. This has been advanced by the advocates for the domestic origin of yellow fever as an argument against the contagiousness of this disease.

"But, upon the same principle, they must deny the contagiousness of all those disorders which I have enumerated in the *first* class, as *itch, syphilis*, &c., for most of them are also to be taken a second time; yet they are acknowledged by all to be *contagious diseases*. In the same manner, many persons make the *smallpox* a standard, and conclude that yellow fever is not contagious, because it is not communicated under the same circumstances of atmosphere and season, and governed by the same laws with that disease.

"They might with the same propriety conclude that the *scarlet fever* is not contagious, because it is not attended with the pustules of smallpox. This teaches us the importance of correct language to convey the several degrees of contagion which have been noticed, and that, while we may make use of the terms now in use, we should annex to them such explanations as will convey those different laws of communication which have been enumerated. With those precautions in the use of the language we employ, I believe the contagionists and non-contagionists will find themselves very much in the situation of those theologians of whom Pascal speaks, and ready to adopt the expression of one of them, when he observes, 'La difference qui est entre nous est si subtile, qu'à peine pouvons nous la marquer nous mesmes.'

"We would then be ready to admit that the yellow fever is a contagious or communicable disease in an *impure* atmosphere, but not generally so where the air is preserved pure and free from noxious materials. This doctrine, too, I believe, will better account for the apparently contradictory facts which have been urged by the advocates of the two opposing opinions than any system that has been adopted."

In a later paper, on the "*Laws of Contagion*," read before the "Literary and Philosophical Society" of New-York, June 9th, 1814, Dr. Hosack maintained, with much ability and at great length, the following propositions:

"1st. That an impure atmosphere is indispensably necessary to multiply and extend the specific poison constituting *plague, dysentery, typhus*, and *yellow fever*.

"2dly. That the impurities of the atmosphere do not produce their effects in the manner suggested by Dr. Chisholm, by increasing the susceptibility of the system to be acted upon by the peculiar virus of those diseases.

"3dly. That, instead of predisposing the body to be thus acted upon, the reverse is the fact; that the predisposition of those who are most exposed to such impure air is less, while those who reside in the pure air of the country are most liable to be infected when exposed to the contagion.

"4thly. That the impurities of the atmosphere are fermentable materials, to be called into action by the specific ferment of those diseases, aided by heat, moisture, and a calm state of the atmosphere; and that, as far as such atmosphere extends, and the circumstances favourable to such fermentative or assimilating process continue, so far those diseases become epidemic, but no farther."

On page 1131, vol. i. (Art. *Continued Fever*), we have given Dr. Edward Miller's classification of *Infections*, and also the modification proposed by Dr. Joseph M. Smith, of New-York. Dr. Miller, in his *Attempt to deduce a Nomenclature of certain Febrile and Pestilential Diseases from the Nature and Origin of their remote Causes*, 1809, "divided the miasmal poisons into two species; the first, comprising the exhalations of the soil, and the second, the effluvia generated by personal and domestic filth. These noxious principles, he says, 'must be considered as gaseous fluids floating on the surfaces, or surrounding the bodies, from which they are respectively exhaled; and hence, like the ethereal fluids of magnetism and electricity, they may properly be called *miasmatic atmospheres*.

"'In order to distinguish these two *miasmatic atmospheres*,' he observes, 'and, at the same time, to duly fix in the mind the impression of the origin and production of them, it is judged expedient to designate each by terms which will invariably express the process of nature in their formation. As the Greek language has been generally resorted to in the framing of scientific nomenclature, I shall employ the adjective *κοινος, common* or *public*, to denote one species of miasma, and *ἰδιος, personal* or *private*, to denote the other. The application of these terms will be readily understood. That portion of air charged with miasmata, exhaled by solar heat from the surface of swampy grounds, or from masses of filth overspreading the open area of cities, according to this distinction, is denominated *Atmosphera koino-miasmatica*. And that other small portion of air, contaminated by miasmata emitted from and surrounding the body, clothes, bedding, and furniture of persons immersed in the filth of their own excretions, and of those associated in the same family with them, accumulated, long retained, and acted upon by animal heat, is denominated *Atmosphera idio-miasmatica*.'"

Dr. M. supposed that these two kinds of poison produce corresponding kinds of febrile disease, one of which he proposed to distinguish by the title of *Pyrexia koino-miasmatica*, the other by that of *Pyrexia idio-miasmatica*. Dr. Smith supposes that these two miasmal poisons may combine, and thus produce *compound* fevers, and that this compound source of disease is of such frequent occurrence, so well characterized, and so distinct, as to constitute a distinct *genus* under the name Idio-koino Miasma, being a combination of the exhalations of the soil with human effluvia. The Bancker-street fever, which occurred in New-York in the summer and autumn of 1820, the Athenian plague, and the fever which prevailed in Philadelphia in 1820–21, are quoted as examples of disease produced by this morbid agent. *Dysentery* is supposed to be a vicarious disease, and to arise from any of the infectious poisons, as in cities and rural districts, from *koino miasma*; in hospitals and chambers of the sick, from *idio miasma*, or, more commonly, from *Idio-koino miasma*, the predisposition to it depending on the secret influences of the general atmosphere. The arrangement of Dr. S., including a synopsis of the remote causes of disease, comprehends that of Dr. Hosack, already given, and is as follows: Order I. Contagion. *Genus* 1. Contagion, communicable exclusively by contact. *Species* 1. *Contagion of Itch, Syphilis, Stevens* of Scotland, the *Lsanda* of Africa, *Frambæsia*, or *Yaws, Hydrophobia, Vaccina*. *Genus* 2. Contagion communicable both by contact and by the atmosphere. *Species* 1. *Conta-*

arranged, 1st. Into idio-infectants, or those which produce diseases incapable of perpetuating their kinds, unless other causes be superadded; 2d. Into those which produce maladies which may be propagated under favourable circumstances, or into *conditionally perpetuating infections*; and, 3d. Into *Specific Infections*, or those which produce diseases which perpetuate their kinds, both immediately and mediately, by *fomites*.

6. i. Under the First Class may be arranged those infections derived from (*a*) endemic sources; (*b*) from the ingesta; and (*c*) from morbid matters generated in the body, and conveyed into the circulation, thereby contaminating the whole frame. The diseases proceeding from these sources never give rise to the infection of the healthy unless they are modified in their characters by superadded causes, or unless they are materially influenced by determining or consecutive circumstances.—*A.* The *miasms or exhalations from the soil* produce a great variety of diseases, according to the temperature and humidity of the air, and the quantity or activity of the miasms floating in it; but the diseases thus produced will not propagate themselves. If, however, other causes are superadded; if the persons labouring under disease from this source be confined in ill-ventilated apartments, or breathe a close air loaded with animal exhalations, the disease may change its form, and assume some one or other of those which arise from the *second class* of causes—from animal effluvia—and thus become consecutively and conditionally infectious. I could adduce numerous instances of diseases originating in local or endemic sources becoming thus infectious. Livy adduces more than one instance of it, and numerous others are furnished in the medical histories of wars and campaigns; but, unfortunately, the circumstances connected with them have rarely been recorded with precision, and sometimes not even with impartiality.

7. *B.* The *use of unwholesome food* infects the body with disease, which is not capable of being communicated to the healthy under ordinary circumstances. But persons affected with diseases from this source may be exposed to additional causes which will change the character and course of these diseases, and give rise, as in the foregoing instances, to a truly infectious property. It is well known that unwholesome and scanty nourishment will produce scurvy, scorbutic dysentery, and low or adynamic fevers. These fevers are generally not capable at first, or as they immediately proceed from this cause, of propagating their kinds, but they frequently assume this character, owing to states of the air, to insufficient ventilation, and to the manners and imperfect civilization of those among whom they occur. Proofs of this were furnished in Italy and France during 1815, 1816, and 1817; at Marseilles in 1812 and 1813; in Ireland during various periods, particularly since the commencement of this century, and even in the present day in some parts of England. The disease which prevailed in the penitentiary, and which was so ably described by Dr. Latham, and the fevers now prevalent among the poor, are proofs of the infectious characters which distempers thus originating generally assume. I am convinced that the low dietaries assigned to the poor in the Union workhouses, in connexion with crowding, and with imperfect ventilation in many of them, have been a chief cause of the present preva-

gion of Smallpox, Measles, Chicken-pox, Scarlet Fever, Hooping-cough. Order II. Infection. *Genus* 1. *Koino Miasma. Species* 1. *Proto-koino Miasma*, producing intermittent and remittent fevers. *Species* 2. *Per-koino Miasma*, producing yellow fever and plague. *Genus* 2. *Idio Miasma. Species* 1. *Protidio Miasma*, producing the mild forms of typhus. *Species* 2. *Peridio Miasma*, producing the malignant forms of typhus. *Genus* 3. *Idio-koino Miasma. Species* 1. *Protidio-koino Miasma*, producing the mild forms of compound fevers. *Species* 2. *Peridio-koino Miasma*, producing the malignant forms of compound fevers. Order III. Meteoration. *Genus* 1. *Sensible Meteoration*, producing croup, pleurisy, and other phlegmasial disorders. *Species undefined. Genus* 2. *Epidemic Meteoration*, producing influenza, pneumonia typhoides, angina, and various other epidemics. *Species undefined.*

"The pathological phenomena which result from infection afford the strongest evidence that there is an affinity between its diseases. But this affinity has its limits. The dogma of the unity of disease derives no support from the similitude sometimes observed between different infectious fevers. Strictly speaking, a unity of disease can exist only where there is a unity of cause. If the same poison operate on individuals whose susceptibilities are different, grades of one disease will be the consequence. As a general truth, therefore, it may be said that different poisons produce different disorders, each of which has different grades that collectively form a unit.

"It has long been a question whether yellow fever and plague are essentially different from intermittent and remittent fevers, or grades of the same disease. If our preceding views be correct, the two former must be regarded as specifically distinct from the latter; for yellow fever and plague are produced by the species *perkoino miasma*, while intermittent and remittent fevers arise from *Proto-koino miasma*. These species and their varieties severally produce distinct fevers of various grades. This view of the subject is applicable to all the species of infection.

"The similarity of the different species of infectious fevers depends upon the affinity of their poisons, which, as it was said before, are probably composed of the same elementary principles varied in their proportions. Now, so far as these poisons are allied to each other, so far only are the fevers occasioned by them grades of the same malady. Though there are phenomena which are common to all the miasmal diseases, yet there are others peculiar to each, which clearly indicate a specific difference in the poisons that produce them. In every febrile complaint there is an assemblage of symptoms which enables the experienced observer to ascertain its nature, and to discern its relations to other disorders."—(Smith *on Epidemics*, p. 108–9.)

We have thus presented the views of several American writers on infection and contagion, and we think it will be admitted that they serve to throw some light on these different subjects, and to reduce to order some of the chaotic materials that have hitherto floated at random in the wide ocean of medical literature. So frequent has been the occurrence, especially in former years, of epidemic and pestilential diseases in our country, that extensive opportunities have been afforded to practitioners to investigate their causes; and in doing this much sagacity and learning have been displayed, highly honourable to the literary reputation of our country. We have seen that the first attempt to establish a distinction between contagion and infection, and to arrange the diseases arising from these sources, was made by Dr. Bayley, in 1796, a distinction, which Dr. Hosack assumes, was first pointed out by this distinguished practitioner, though afterward claimed by Dr. Adams, of London, in his work on *Epidemics*, and on *Morbid Poisons*. In 1796–7, Dr. S. L. Mitchill published, in the *New-York Medical Repository*, his *Doctrines on the Pestilential Fluids*, usually denominated the *Theory of Septon*. In 1804, Dr. E. Miller published his views on infection, as already stated. In 1808, Dr. Hosack, in a letter to Dr. Chisholmn, of England, proposed a new theory on the laws governing the communication of contagious and infectious diseases (*Ed. Med. and Surg. Journ.*, vol. v.), the substance of which we have presented in his own language (Blane's *Med. Logic. Annual Med. Review*, vol. ii.). We are not aware that any additional light has been recently thrown upon this subject. The question of the contagiousness of yellow fever is at this moment (August, 1845) undergoing as warm, violent discussion in New Orleans and other of our Southern cities, as it did in New-York and Philadelphia in 1796, 1800, and 1822, and, so far as we can see, is no nearer a satisfactory settlement. The weight of medical opinion is undoubtedly opposed to the doctrine of Mr. Copland, that it owes its spread to a specific infection of an impalpable nature, emanating from the bodies of those already affected.—(See Art. Yellow Fever.)]

lence of typhus throughout the country. And although the infectious visitation may not have reached those who have been the prime movers in the iniquity, yet it may overtake some of them with no measured retribution. Persons who require the aid of the Poor Law have usually, as respects food or drink, and sometimes as regards both, lived fully or intemperately; and when they are subjected to a diet altogether insufficient for the continuance of health even in the temperate, low fever, which readily propagates its kind among the predisposed, and on occasions favouring communication, soon makes its appearance. This result the more certainly follows when numbers are similarly circumstanced, and placed in buildings possessing no thorough ventilation or perflation of air. The only recently-erected Union workhouses which I have seen are most improperly planned, inasmuch as they have windows only looking into the interior of the court, of which they form three of the sides. This is shameful if it proceed from ignorance, and flagitious if it be done designedly. We can hardly suppose architects so ignorant of the most generally acknowledged principles of their art as to neglect ventilation where it is most required. Are we therefore to consider that they have been controlled by those who have sacrificed feelings of humanity to the expediency of political economy?

8. From considerable observation and reflection, I infer that disease may take place sporadically, or from local causes; and owing to various circumstances, acting either in close succession or coetaneously, the circulating and secreting fluids, and even the soft solids, may be so changed during its course as to emit an effluvium contaminating the surrounding air, and thereby infecting many of those who breathe this air in a sufficiently contaminated state; and thus the disease will be propagated to several, and from these to others, especially under favourable circumstances of temperature, humidity, electrical conditions, and stillness of the air, and of predisposition on the part of those who come within the focus of infection. Thus diseases may become *infectious*, and, when aided by the constitution of the air and other circumstances, even *epidemic*. After thus spreading for a time, they may cease or entirely disappear with the circumstances which combine to propagate them.

9. *C.* The *Self-contaminating agents* or morbid matters formed in a part, and afterward infecting the system generally, but seldom, perhaps, give rise to disease capable of propagating its kind. When sanious or purulent matters are carried into the circulation, the consequent alteration in the blood gives rise to phenomena closely resembling typhoid or low fevers in many cases; but I do not believe that the malady thus produced will infect the healthy, unless under circumstances peculiarly favourable to infection, as in puerperal females, in the wards of lying-in hospitals. I think it extremely probable that the sanious fluid constituting the lochia may be absorbed or imbibed from the surface of the uterus, particularly when the uterus contracts imperfectly, or when the discharge is retained or accumulates, and when vital power is much depressed, and that the consequent pollution of the circulating and secreted fluids will give rise to an effluvium which may produce puerperal fever in a female recently confined, if she come within the focus of infection. It is not improbable that erysipelas also may be excited by the effluvium emitted from a person thus diseased. I attended with another practitioner a case of dangerous puerperal fever of this kind. A lady visited this patient, and leaned close to her mouth, so as to hear her faint articulations, but perceived her breath so offensive, and felt it produce so unpleasant a sensation on her own face, as to induce her to remove to a greater distance. This lady continued to perceive the unpleasant odour and to feel the sensation in the face until the following day, when she experienced chills, with swelling and redness about the nose, extending over the face: a complete attack of erysipelas followed.*

10. That the morbid secretions of persons affected with low fever, consequent on the absorption of morbid matters into the circulation, will infect the healthy frame when inserted into a wound or under the cuticle, or even when applied to a mucous surface, is by no means improbable. I have seen the most dangerous diseases arise from the inoculation, and even from the contact of the fluids during the examination of the bodies of females who had died of puerperal disease, caused by the passage of sanious or morbid secretions into the circulation, as well as by the influence of an impure air. The danger of infection or inoculation from these cases is great in proportion to the shortness of time that has elapsed from dissolution, and it is particularly great when the body still retains some of its warmth. The above considerations and facts prove that, although the several orders of agents comprised under the *first class* produce merely a sporadic form of infection, or infect merely those exposed to their sources, and give rise to diseases generally incapable of propagating their kind, yet the concurrence of additional causes or influences during their course will develop a disease capable of being communicated to the healthy under circumstances of predisposition, and in similar modes, as well as by the same media as the diseases produced by the class of agents next to be noticed.

11. ii. *The second class of agents.—A.* Effluvia from *animal exuvia* and *animal secretions and excretions* directly occasion those forms of disease which infect the healthy by contaminating the surrounding air. The particular *form* or *species* of malady thereby produced depends much upon the nature of concurrent causes; upon the concentration or accumulation of the effluvium; upon its sources; upon its admixture with miasms from decayed vegetable substances; upon the temperature, humidity, and electrical states of the air; upon the susceptibility or state of predisposition of those exposed to it, and upon pre-existing disorder. The operation of some of the sources of infection falling under this head has been disputed. Dr.

* [We believe it to be well ascertained that the same morbid principle that gives rise to epidemic erysipelas also occasions puerperal fever, and *vice versa*. We could relate numerous examples of this kind that have fallen under our own observation, were it necessary. The extensive coexistence of these two diseases in many sections of the United States, during the last few years, have led many practitioners to the same conclusion.—(See Art. *Erysipelas.*)]

Bancroft, by a laboured special pleading, has denied the injurious influence of putrefying animal substances; but much depends upon the temperature in which this process takes place, the concentration of the emanations arising from this source, and epidemical states of the air. When the temperature is low, and ventilation is preserved, no very acute or sudden disease results from this cause, particularly to those accustomed to it, although a gradual loss of health generally follows its continued or frequent influence. But in other circumstances, particularly when aided by concurrent causes and marked susceptibility, febrile diseases of a low or adynamic form, and of an infectious character, where free ventilation is not preserved, generally appear. The emanations from the lower animals, as horses and cattle, crowded in ill-ventilated places, produce infectious diseases, not only among them, but also in those of the human species who may breathe for some time the air which is thus contaminated. Livy, Dionysius of Halicarnassus, and Orosius mention a destructive disease which appeared in Rome 464 years before Christ. Livy states that it occurred in autumn from the crowds of countrymen and herds of cattle received within the walls of the city; that it was aggravated by the infection arising from the crowded state of the close buildings, by the heat and want of rest; and, moreover, that the disease was propagated by contagion and by the attendants on the sick. The same historian records that, in the 325th year from the foundation of Rome, a remarkable drought and famine extended throughout the Roman territory; that diseases followed, first invading cattle, and afterward infecting the rustics and lower classes of people, and then extending to the city. That diseases of an infectious nature may be developed in the lower animals by their confinement in close or ill-ventilated places has been proved on numerous occasions, and there is no reason to doubt the possibility of the distemper thus produced being communicated to the human species. A number of horses shut up in the hold of a transport will generate glanders in some of them, the morbid secretion of which will communicate a similar disease to persons employed about those which are affected, especially if it come in contact with the mucous surfaces. It may be stated as an axiom that the foul air generated by the crowding of many persons or animals into a confined space, even in health, but more especially in disease, as in the wards of hospitals, &c.; or by a few persons only in the same apartment, if their diseases be attended by copious discharges, will infect those who breathe it in a state of predisposition, with low fever, dysentery, &c.; and that the persons thus infected will communicate the malady to others similarly predisposed. Although animal effluvia infect the healthy chiefly by their diffusion in the atmosphere, yet the infection will not take place unless near their sources, or in situations where they become concentrated. Much, however, will depend upon the predisposition or susceptibility of persons exposed to them.*

12. *B.* Certain maladies do not perpetuate themselves by effluvia or by an impalpable emanation, but by *the contact of the secretions formed in their course*; and these secretions will seldom induce disease unless they be inoculated, or come in contact with a mucous surface. Other secretions, particularly from diseased animals, when brought in contact with the unabraded skin, will sometimes produce serious distempers. Instances of this fact are furnished by the malignant pustule, and by other maladies already noticed. The inoculation of putrid animal matters, and the bites of poisonous reptiles, infect or contaminate the whole frame in a sufficiently remarkable manner, the former agents producing a low, irritative, or adynamic state of fever; but the diseases thus produced seem incapable of propagating their kind, unless by the inoculation of morbid matters formed in their course, or taken from the body after death; and then the effects will probably vary with the previous state of health of the person thus infected, and with various concurrent circumstances.

13. iii. Of *the third class of infectious agents.*—It is unnecessary to add anything to the statement contained in the classification of these agents which I have attempted. The impalpable emanations and consistent secretions of which they consist produce specific forms of disease, whether they operate *directly*, or by various *media*, or *fomites*. But, although the chief characters of these maladies are uniformly preserved in all of them during their transmission, yet several of them are much modified by concurrent causes, by the circumstances or existing states of the affected, and by endemic and epidemic influences.

14. II. Of the Proofs of Infection, *or the circumstances proving a disease to be capable of propagating its kind.*—It has been asserted by some recent writers that the doctrine of infection, by contact or otherwise, is a comparatively modern invention. These assertions have been made by persons possessed neither of sufficient medical learning nor practical information to attach any degree of importance to their opinions. It has been satisfactorily shown by Dr. Yeats in this country, by Dr. Marx in Germany, and Dr. Omodei in Italy, that the doctrine of contagion was recognised by the ancient Egyptians and Jews, by the Greeks and by the Romans; and that it was equally believed in during the middle ages, although the notions of many respecting it, even among professional writers, were often loose and inaccurate. It is unnecessary to adduce proofs of the acquaintance of the ancients with contagion, as this has been done so satisfactorily by the writers just mentioned. Some evidence, also, on this subject will be found in the article Epidemic Influence. Indeed, the matter would never have been questioned had not commercial men, in order to remove some impediments in the way of their traffic, properly imposed for the public good, employed persons to write in favour of their interests, but with an ability and success quite commensurate with the truth and justice of their cause. The question, however,

* [A very good example of this kind of infection may be found in the *purulent opthalmia*, which is invariably generated where children are crowded together in poorly ventilated apartments, and fed on innutritious diet. Again and again has this disease broken out among the pauper children of New-York, at the Long Island Farms, and the danger of its spread by contagion, when so originating, is too well known to need remark.]

as lately agitated, is not so much the existence or non-existence of infection or contagion in any circumstances, and as respects all diseases, for proofs of the possession of these properties by certain maladies are so incontrovertible as not to be doubted; it is principally with respect to the infectious nature of pestilential epidemics, as plague, yellow fever, and epidemic cholera, that the subject has created so much interest and discussion at the present day. When we consider the extent to which the dread of the importation of these maladies impedes commercial undertakings, in connexion with the little consideration human life receives in the prosecution of commercial objects, it is not likely that the contingent importation of infection will operate in such a manner as long to prevent attempts at the removal of existing salutary restrictions, although the *proofs* as to the existence of an infectious property in these distempers are considered quite conclusive by all candid inquirers.

15. i. There are various circumstances which, singly or conjoined, *prove* a disease to be *truly infectious*, or capable of propagating itself. 1st. The arrival in places which are healthy of persons from districts in which a disease is prevalent, and the spread of such disease soon afterward in the previously healthy place. 2dly. The extension of such disease in this place, in proportion to the intercourse between the affected and the healthy. 3d. The greater prevalence of such disease among persons who devote themselves to its alleviation, as among medical attendants, nurses, and the friends of the sick. 4th. The absence of any other cause to which the malady may be attributed, the soil, the climate, the season of the year, the weather, neither singly nor conjointly, serving to account for it. 5thly. The immunity obtained by seclusion and by avoiding communication with the sick and those who have visited them, as well as by the careful exclusion of all substances which may have imbibed and retained the emanations from the affected. 6thly. The success of measures taken to prevent the extension of the malady, as the early removal of the sick to places where communication with the healthy is prevented. Besides these there are other proofs which are even more conclusive. When we perceive the healthy become affected with a malady soon after proximity to, or contact with a person labouring under a similar malady, or after having been exposed to substances which have imbibed the effluvium from the sick, as bed and body clothes, &c., the evidence of infection from these sources, although not amounting to complete certainty, yet nearly approaches it. Instances of contagion by *inoculation*, and by immediate or direct communication with the sick, are sufficiently numerous in respect of several maladies, and are familiar to all; and the evidence of infection by substances which have imbibed a morbid effluvium or secretion—by *fomites*—is not less strong, although it is in some cases not so conclusive, and hence it has been more frequently impugned. It has been satisfactorily shown to all candid minds, and numerous instances have occurred to my own observation, of a disease having been conveyed in the clothes of a second person, and communicated to a healthy individual. That this has occurred with respect to certain maladies acknowledged infectious cannot be disputed by the most captious objector. The only questions admitting of doubt are, to what diseases should this capability of propagation be extended, and for how long a period, and under what circumstances may the infectious effluvium be thus retained and conveyed? Some answer to the first of these questions will be obtained by what is hereafter to be advanced; as to the second, it is impossible, from the nature of the subjects involved in it, to furnish precise information. There is every reason, however, to state that the body-clothes or bedding, used by a person while sick of an infectious disease, may communicate the same malady several, or even many months afterward, if they have been shut up from the air; and I have known several instances of a disease being conveyed from the sick to the healthy, the person who has been the medium of communication having walked a distance of upward of two miles in thus conveying it.

16. ii. *Of the media by which infectious agents are communicated to the healthy frame.*—a. The *miasms* or *mephitic vapours* exhaled from the sources already enumerated are evidently suspended and rendered active by the humidity of the atmosphere in the situations in which they are disengaged; for it has been repeatedly shown that these miasms are active in proportion to the grade of atmospheric humidity, and to the circumstances which augment that humidity. Their presence in the air brings them in contact with that part of the animal economy presenting the greatest extent of surface, the greatest vascularity, and the freest communication with the circulating system. Although the atmosphere, aided by humidity and a moderate or high range of temperature, is the usual medium of infection, especially in respect of those maladies which emit an offensive effluvium or emanation, yet there are other media which observation has shown to be not infrequent means of communication. Numerous substances imbibe, retain for a considerable time, and convey the invisible or *infectious* emanations, as well as the palpable and *contagious* virus, or consistent secretions of the sick, and become media by which infection is conveyed from one person or from one country to another, between whom a greater or less distance is interposed. Of the various materials which may thus be the means of transmitting infectious diseases, animal productions, particularly woollen and hairy substances, bedding and body-clothes, furs and feathers, have the greatest disposition to imbibe and to retain the morbid effluvium. The *length of time* during which the morbid *seminium* may thus be retained and still be operative has never been accurately determined. Probably the period varies with the disease from which it proceeds. There can be no doubt that it depends much on the exclusion of the atmosphere, and upon the temperature to which it has been exposed.

17. *b.* When infection is produced by substances which imbibe and retain the morbid effluvium or secretion, it does not arise from actual contact with the substance which is thus the medium of communication, unless it conveys a more or less consistent virus or secre-

tion. The substance imbued with the morbid effluvium retains it while shut up from the air for a longer or shorter period, but more or less readidly imparts it when exposed to the atmosphere, which now becomes the infecting medium. Even the clothes of an attendant upon a person labouring under an infectious disease will retain the morbid emanation much longer than is generally supposed. There are few who will dispute the fact of infectious diseases being often communicated in the clothes of medical men, and other attendants on the sick. I have known several instances of smallpox, puerperal fever, and pestilential cholera being thus propagated. I was recently called to the wife of a physician in the most malignant form of smallpox, conveyed to her by her husband while he was in attendance on a case of this disease at a considerable distance from his own residence. Some time ago I was requested by a practitioner in extensive midwifery practice to see a case of true puerperal fever. He had, within a few days, lost five patients from this malady. I asked him to consider whether he might not have been the medium of communicating the disease to most of them. Before my attendance on this case terminated, he expressed his conviction that he had communicated the malady to four at least of the six. Similar instances have been mentioned to me by other obstetric practitioners. I am convinced of having conveyed the infection of pestilential cholera in my clothes in two instances.

18. *c.* The infection or contamination caused by ingesta, or by substances used as food and drink, is generally not so rapid in its progress, or so dangerous as when the infectious agent acts through the medium of the air upon the lungs, or when it is conveyed into the system by inoculation. Some, however, of the more active poisons may be said to furnish exceptions to this law, but they hardly come within the present category. Unwholesome articles of food generally infect the system by a succession of morbid changes requiring more or less time for their development; and much of their baneful effects is counteracted by the vital influence and resistance of the stomach, and by the changes produced by the gastric juices. Still, in proportion to the injurious nature of the substances received into the stomach will the organic nerves be morbidly impressed, or the chyle and blood contaminated by the noxious fluids or matters absorbed from the digestive canal, or both kinds of disorder be induced, the effects varying with the activity of the injurious agent, and the duration or repetition of its operation. A morbid emanation, which would produce an immediate effect upon being inspired with the air, will be quite inoperative when received into the stomach mixed with the saliva; and a morbid secretion or virus, which would be followed by the most dangerous results when inserted under the cuticle, may be swallowed with impunity. The matter of smallpox will produce no effect when conveyed into the stomach of a person who will be readily infected by the effluvium or the virus of the disease; and the same obtains with respect to other contagious maladies. The immunity from the one medium of communication, and the ready operation of the others, are accounted for by the structure and functions of the organs and parts to which the infecting agent is applied. From this the ignorance of pathological principles displayed in the silly and disgusting attempts to prove certain maladies to be non-infectious or non-contagious, by tasting or swallowing the secretions to which they give rise, will be sufficiently evident.

19. *d.* In cases of general infection of the frame, resulting from a local source of contamination existing in the body itself, the media of infection may be readily inferred. Cancerous, sanious, or purulent matters may be formed in a part of the body; and as long as nervous power and vital resistance are not materially depressed, either the mischief is limited, or attempts are made at throwing it off; but as the system becomes weakened, the disease extends, absorption takes place, the morbid matter carried into the circulating vessels vitiates the blood, and hence arise imperfect and disordered secretion and excretion, insufficient digestion and assimilation, and a general infection of the fluids and solids of the body.

20. *e.* The *effluvia* or *emanations* from a number of persons, even in health, shut up in a confined space, or in ill-ventilated apartments—from the lower animals similarly circumstanced—from the sick in crowded wards, &c.—and from those with infectious or contagious diseases, generally operate almost entirely through the medium of the atmosphere, and with an activity in proportion to the humidity of the air, and to the accumulation of the noxious effluvium, relatively to the susceptibility or degree of predisposition of those exposed to its action. But as all the emanations from the sick consist in a great part of watery vapour, even a dry air, if it be not quickly renewed, will at length become so moist as to be soon as injurious as that which was already humid. Moisture favours the development of infectious emanations, increases the activity of all of them, and heightens the predisposition of persons exposed to them. Experience has shown that the emanations from the sick seldom infect the healthy while the air is dry, cool, and freely renewed; that infectious diseases seldom occur, or appear only sporadically in such circumstances; and that these diseases generally prevail or become epidemic in warm, humid, and stagnant states of the atmosphere. The crowded wards of hospitals, ships of war, and transports generally continue healthy as long as dryness and freshness of the air are preserved. But as soon as these requisites to health are neglected; when the floors of the former or the decks of the latter are frequently washed, so as to render the air moist, the emanations from the healthy as well as from the sick readily accumulate or acquire activity. Fevers, dysentery, scurvy, erysipelas, and even hospital gangrene, or phagedenic ulceration and phlebitis, will thus be developed or rendered prevalent.

21. *f.* Although there are various agents which infect the body in a certain determinate mode or medium—as typhoid and exanthematous fevers, by the emanations proceeding from those affected by them floating in the air—syphilis, by contact, rabies, by inoculation, &c.—yet there are others, as arranged above, which operate in more than one, or by all these modes. There are some sources of infection respecting which we are still insufficiently informed as to

the several modes or media of their action. A person, on opening a recent body that has died of peritonitis, may have a pustular or erysipelatous inflammation of the skin of his hands, with smart fever produced, although there has been neither puncture nor abrasion of the cuticle, and if either has existed his life will be placed in the utmost jeopardy. Mr. Kiernan informs me that he has even seen, from the inspection of cases of this description, very severe constitutional disorder produced in those who had never touched the bodies which were examined. In these instances, the effluvium exhaled from the peritoneal cavity or from other internal parts, upon first exposing them, must have infected the system.

22. III. The Effects, or the Diseases, produced by Infection vary with the sources and modes of infection, with the concentration or intensity of the infectious agents, and with the predisposition or susceptibility of the persons exposed to them. Certain of these agents produce a determinate effect, or a specific form of disease, particularly those comprised under the third class.—*A.* It has been supposed that the terrestrial miasms or mephitic vapours, emitted by marshes and other sources of malaria, produce only intermittent and remittent fevers. Some writers, however, have contended that true yellow fever, and even plague, also spring from these sources, aided by the influence of high ranges of temperature and an epidemic state of the air. That terrestrial miasms are capable of producing, under these circumstances, pernicious or malignant forms of fever, which assume either a remittent or a continued type, according to concurring causes and the state of the patient, I will readily admit; but that they occasion either true yellow fever or plague is an assumption founded on preconceived and fallacious views, which every circumstance connected with the origin and pathological relations of these maladies fully disprove. (See Art. Pestilences.)

23. That malaria, however, produces a wider range of diseased action than has been long supposed, I will allow; for I agree with much that has been advanced by Dr. Macculloch on this subject, and believe that the less concentrated states of terrestrial exhalation, particularly in low grades of atmospheric temperature, will give rise to several diseases usually imputed to other causes, as to catarrhs or catarrhal fevers, rheumatism, neuralgic affections, sciatica, obstructions of glandular organs, and premature decay. When terrestrial exhalations are concentrated or rendered more active by a warm and humid air, bilious inflammatory remittents, gastric or mucous fevers, cholera, dysentery, and visceral diseases will frequently result, according to the existing disposition or states of those exposed to them.

24. *B.* The contaminating effects of unwholesome kinds of food and drink frequently declare themselves in specific forms and modes. Ergotism, gangrenous ergotism, scurvy, scorbutic dysentery, adynamic dysentery, &c., are illustrations of this. On many occasions, however, the ingesta constitute only one of the sources of infection, or other causes concur with this in producing the effect. Mucous, gastric, and putro-adynamic fevers and dysenteries, even when chiefly occasioned by septic or diseased articles of food, or by water containing putrid animal matter, are often aided in their appearance by additional causes; when foul water is concerned in the production of septic or adynamic maladies, animal or vegetable exhalations, or both, and unwholesome food frequently co-operate with it. The fevers and dysenteries so generally developed in armies, in besieged towns, &c., seldom proceed from a single source of contamination only. When they assume highly infectious and typhoid forms, it will generally be found that putrid and impure food and water, exhalations from animal exuviæ, and from the surrounding soil containing numerous dead bodies imperfectly covered with the earth, famine, fatigue, and the depressing passions, first contaminate the frame; and that the exhalations from persons confined in close places, and from those first affected by those causes, heighten still farther the morbid effects, until a most malignant malady is produced. It is extremely probable that the air of a place thus circumstanced, and especially the moisture floating in it, may become so saturated with noxious effluvia derived from these sources as to assume a pestilential character, the infection extending to nearly all who breathe it, but becoming less remarkable as the distance from the focus of infection increases. Hence it is that in large, crowded, or populous cities, particularly in seasons when the temperature is high and the air humid, and is already contaminated by the circumstances which necessarily attach to them, and especially by exhalations from animal exuviæ and burying places, the infectious emanations from the persons first attacked by the resulting febrile maladies heighten the existing aerial contamination, produce a more marked effect, and more readily spread the malady in these places than in those differently circumstanced. During the pestilence in Rome, during 262 and 263, the air is stated by Eusebius and Cedrenus to have been so contaminated by the emanations from the sick and dead, that the dew which fell in the mornings and evenings presented a sanious or putrid appearance on the surface of objects. It is chiefly owing to this circumstance that when an infectious disease becomes very destructive, or assumes a pestilential form in crowded cities, it seldom spreads extensively in districts far removed from them, although it is generally communicated, to a greater or less extent, to the healthy by those who have left the source of infection, and by *fomites*; for the circumstances favourable to the infection are there wanting.

25. That continued fevers of a low, adynamic, typhoid, or putro-adynamic character, dysentery, erysipelas, hospital gangrene, phlebitis, puerperal fever, diffusive or disorganized inflammation of cellular parts, and the diseases enumerated in the Classification, as the results of the various kinds of contaminating or infectious agents comprised under the *second class* of my arrangement, arise from these sources, may appear paradoxical to many. But an extensive examination into the subject will show that animal affluvia produce those diversified effects, according to the nature of the effluvia, to concurrent circumstances, and to the peculiarities of the persons affected; and that the resulting maladies perpetuate their kinds when the conditions favouring this occurrence are

present. That morbid actions, often of a most dangerous and malignant kind, follow the inoculation of morbid secretions and septic animal matters, although these secretions may not have been taken from a person labouring under a disease generally recognised as being infectious or contagious, has been evinced on various occasions, and shown even by experiments. Much, however, in these cases, depends upon the health of the persons who may be thus inoculated. The general persuasion that diseases usually recognised as contagious alone can be communicated in this way is by no means correct, for the range of infection by inoculation is much wider. Indeed, I consider it as a pathological principle, that morbid secretions and septic animal matters, from whatever source, will, if applied to an abraded or divided living surface, or allowed to remain in contact with a mucous, or even with the external surface, give rise to some one of the maladies assigned in the Classification to this order of agents; and that the morbid matters generated by these maladies will produce similar effects in others, if applied in the same way, provided that a predisposition to the infection exists. This predisposition manifestly consists of depressed constitutional power, and weakened vital resistance, often in connexion with disorder of the digestive organs, and sometimes with general cachexia.

26. The maladies which are produced by the third class of agents, or by *specific infections and contagions*, are, with few exceptions, so generally recognised as the results of the operation of these agents, as to require no remark. The diseases that may be viewed as exceptions to this mode of origin by some writers, whose powers of argumentation and knowledge of the sources and course of morbid actions have secured for them but slight reputation with competent judges, cannot be more particularly alluded to in connexion with their sources at this place.

27. *C. The diseases produced by infectious or contagious agents may be modified or aggravated by superadded or consecutive causes.* This is especially the case with those febrile maladies which arise from endemic sources, and from animal effluvia. The emanations from the sick of these maladies, if allowed to accumulate around the patient, particularly where several are confined in ill-ventilated places, will aggravate the disease, impart to it new characters, and an infectious atmosphere may be thus generated capable of producing a modified, or even a different, but generally a much more malignant malady than that which originally existed. The aggravation of diseases by the accumulation of the emanations from the sick, or from any other source productive of infection, obtains generally. On the other hand, free ventilation exerts a beneficial influence, and prevents the contamination of the circulating fluids, as well as the depression of vital power that would otherwise result.

28. Humidity and dryness of the atmosphere have much influence upon infectious maladies. The former not only gives activity to infectious agents, but also aggravates their effects, and predisposes the human frame to their operation. Infection is, in the first instance, thereby favoured and accelerated; and it is subsequently aggravated in the whole progress of its resulting phenomena. Dryness of the air, on the other hand, either prevents infection or delays the development of its effects. The depressing passions, fear, and whatever lowers vital energy, are most influential and powerful concurring and aggravating causes of infection, both before it is fully developed and during the course of its effects.

29. IV. Of the Period which elapses from the First Impression or Operation of Infectious Agents till the Development of their Effects.—The period which elapses from exposure to the agents of infection until the development of their effects varies remarkably in its duration, as respects not only different infectious maladies, but also different persons exposed to the impression of the same agent. This period has been denominated the *latent* period and the period of *incubation* by French pathologists. I have, in the articles Disease and Fever, called it the *formative, premonitory*, or *precursory* stage, or the period of *premonition*, because the changes taking place in the constitution during this stage are productive of the subsequent phenomena, and are generally manifested by certain symptoms, attention to which may often prove of essential service in the prevention or treatment of the consecutive disease. The *duration* of this period has been differently stated by different writers, as respects almost every infectious disease. In some of these diseases it is quite indeterminate; but, as regards others, it is more uniform.—*a.* The precursory period of diseases which proceed from terrestrial or paludal emanations varies from six or seven days to as many months. From data obtained by Dr. Gregory, it would appear, that of a number of persons exposed to malaria proceeding from the same source at a precise period, thirteen days was the shortest, and thirty-nine days the longest duration of this period; and that in the greatest number, agues and remittents were developed on the 20th and 22d days after infection. In some cases, where I had an opportunity of observing this period, remittent fever appeared in some six or seven days, and in others a few days later, after exposure to the cause. Dr. Marsh infers, from numerous instances furnished him in Ireland, that this period may be protracted to eight or nine months.

30. *b.* The duration of the formative period in *typhoid fevers* has not been observed with sufficient precision. Dr. Haygarth declared that the minimum was seven days, and the maximum seventy-two days. Dr. Bancroft inferred the minimum period to be thirteen days; but the observations of Sir W. Burnett, Dr. Marsh, and others prove that the period is much shorter. Dr. Marsh, indeed, endeavours to show that the febrile rigour may succeed almost immediately to the exposure to the infectious effluvium. But in many of the instances which he adduces there is every reason to suppose that a previous exposure to infection had occurred, *that* which seemed to have made the morbid impression having only been a consecutive or determining cause of the disease. Dr. Williams thinks that this period may extend from a few hours to a few weeks, or perhaps to a few months. I have stated that it may not continue beyond twenty-four hours in the worst

forms of these fevers, and that the most common duration is from three to fourteen days. This agrees with some observations which I have lately had an opportunity of making. Dr. Gregory considers that the medium duration of this period in these fevers is ten days.

31. *c.* The precursory or formative period in *measles* generally continues from seven or eight to fifteen or twenty days. Dr. Bateman states it to vary from ten to fifteen days. Dr. Gregory from eight to twenty-one days. Dr. Williams remarks that the time which this poison might remain latent has been determined to vary from ten to sixteen days. This agrees with the observations of Dr. Heberden and Dr. Hue. Dr. Home, who first tried the inoculation of measles, observed that the eruption appeared on the sixth day afterward. The experiments of inoculation in measles by Vogel, Monro, Tissot, Cullen, Speranza, and others furnish no additional information on this subject. M. Guersent is of opinion that *hooping-cough* appears five or six days after infection. I have stated that it is generally from five to nine days, or even longer, after exposure to infection before the cough commences.

32. *d.* In *scarlet fever*, the formative period varies in duration from one to twenty or twenty-five days. Dr. Williams considers that it continues from a few hours to about ten days. Dr. Binns assigns two days as the shortest period; Dr. Withering three or four days; and Dr. Heberden and Dr. Frank five days; Dr. Blackburn believes that the period varies from four to seven days; and Dr. Willan that it rarely continues longer than six days. The duration of this period depends much on the character of the epidemic. Dr. Maton observed, in one epidemic, this stage prolonged to twenty-five or twenty-six days. In a most malignant case of the disease which I recently attended, infection was produced by some of the secretion from the mouth of a patient having been conveyed by the hand to the glans penis of a different person. Most violent asthenic inflammation and excoriation extended thence over the genitals, to the groins, abdomen, and inside of the thighs.

33. *e.* In *smallpox*, the duration of the precursory period varies from six to twenty or twenty-one days. When the disease appears in the natural way, or by the medium of the air, Dr. Gregory thinks twelve days to be then the usual period. When smallpox is *inoculated*, the eruptive fever commences seven days afterward, but it may be delayed a day or two longer. Indeed, cases occasionally appear in which this period is either shorter or longer than that now stated.

34. *f.* In *plague*, the precursory period may be very short. Sir Brooke Faulkner has mentioned some cases in which the attack seemed to follow almost immediately, or within a few hours, upon the impression of the infectious effluvium. Some writers have stated this period to vary from two to fifteen days, five days being its medium duration. The disease has occurred on the fourth day after its inoculation. *True yellow fever* usually appears from two to twelve days after infection; but it may take place in a few hours after the impression of the morbid effluvium, when concentrated. In *pestilential cholera*, the precursory period varies from one to six days, according to my own observations; and this agrees with the statements of others. This period may, however, be somewhat shorter or much longer than now stated. True or *malignant puerperal fever* usually occurs from one to five days after infection, but it may be delayed beyond this period.

35. *g.* The time that the infection of *erysipelas* takes to develop itself has not been accurately determined. Dr. Williams thinks that it may vary from two to fourteen days. In the instance above alluded to, and in some others that I have seen, the period was not longer than thirty-six hours. In the various forms of infection proceeding from the inoculation of morbid matters, or from injuries during the dissection of recent or of putrid bodies, the constitutional effects are usually manifested within three days, sometimes in the course of a few hours, and very rarely after four days.

36. *h.* The morbid secretions productive of the various forms of *venereal disease* evince their effects at various periods, between one or two days and two months. The *gonorrhœal* affection generally appears much earlier than the *syphilitic*; the former most frequently showing itself from two or three days to ten or twelve, the latter from six or seven days to two or three weeks.

37. *i.* The virus of *rabies* takes a longer time in developing itself than any other infectious agent. There can be no doubt of the precursory period of this malady being sometimes prolonged much beyond what is generally believed, although the very long intervals stated to have elapsed in some instances are quite apocryphal. There are, however, well attested cases of two years having passed from the insertion of the virus until the appearance of the malady. Instances of from four to twelve months having thus elapsed are by no means rare. The *shortest* period of premonition in rabies may be stated to be twenty-one days. In the greatest number of cases, the disease appeared from thirty-one to sixty-three days after the inoculation of the morbid secretion.

38. *After the first impression* of an infectious agent until the development of its effects, or during the whole of this precursory period, the change produced in the economy presents certain general features, which are of the utmost importance to recognise and to estimate aright. These changes are not materially different in the different infectious maladies: they vary, however, in intensity as much as in duration; but they often possess very nearly the same characters, which always manifest the production of a more or less noxious effect upon the economy—as depression of nervous and mental energy, and of all the manifestations of life. These manifestations are, however, severally depressed in different degrees in different maladies during this period; and certain organs experience this effect more than others, as well as betray a specific or peculiar mode of affection, according to the nature of the infectious agent. In those distempers which proceed from the more intense or concentrated agents, and in which the precursory period is short and severe, the effect produced upon the nervous system is generally immediate and remarkable. Not only are the physical functions depressed and embarrassed, but the mental and moral

powers are remarkably weakened or nearly annihilated. In true yellow fever, in plague, and in puerperal fever the patients become indifferent to their fate, and care not for the most intimate relations. The sensibilities are not merely blunted, they are almost destroyed; and a similar effect is observed in many other infectious maladies, although not in so remarkable a degree. Much of the calmness displayed by persons in this, as well as in the more advanced stages of these diseases, results not so much from a philosophical or stoical suppression of the sentiments and emotions, as from a generally impaired power of the organic nervous system, and a consequent impairment or loss of the general sensibility, and of the cerebral energy. Hence the physical change is often such that those parts of the frame which are the most intimately related to the manifestations of mind, or which either minister to them or are their instruments, are more or less incapable of discharging their offices.

39. V. The Symptoms or Indications of Infection vary remarkably in the rapidity of their production, in their intensity, and in their numbers, forms, and modes of grouping. But it is of importance that they should be recognised by the physician. When the infecting agent is intense, as when a concentrated animal effluvium or an accumulated emanation from the bodies of the sick is directed upon a susceptible person, then the effect may be as instantaneous as electricity, as well as most intense. In some rare cases of this kind, as in plague and in other pestilential maladies, life may be destroyed in a few hours by the morbid impression which it has been quite incapable of opposing, and against which it has been unable to react. I have seen the emanations from typhoid fever, from yellow fever, and from pestilential cholera immediately produce sickness, vomiting, pain, sinking and anxiety at the epigastrium, faintness, oppression at the chest, remarkably weak pulse, headache, and general vital depression, with pale countenance and shrunk surface; and from these the patient has never rallied, the symptoms increasing in severity, and others supervening, until death has occurred in a very few hours.

40. Where the agents are less active or less concentrated, or where the predisposition is not so great, a much longer time is taken in the development of the changes constituting the precursory period of infectious maladies; and in the majority of those the vital powers resist the farther progress of these changes in that particular direction, and a salutary *reaction* is established. In many instances, little or no complaint is made after exposure to infectious agents, although a morbid impression has actually been made by them. In some only a slight *malaise*, or an indefinite feeling of indisposition, indicative of depression of vital power, only is complained of. In others the depression is much more manifest, and is attended with a weak or slow pulse, or with unusual acceleration of the pulse upon slight exertion; with chills, alternating with flushings or heat of skin, depression of spirits, and pallor of the countenance, great weakness of the joints, and impaired power of the digestive, secreting, and excreting functions. When infection is produced through the medium of the respiratory organs, the earliest effect that is observed is a feeling of constriction or oppression in the chest, or at the præcordia and epigastrium, attended by frequent sighing, gaping, forced and deep inspirations, and by uneasy sinking, depression, or nausea, and sometimes by pain at the stomach, and by vomiting. The natural and acquired appetites and desires are diminished or nearly abolished; nausea is readily excited by food, and the bowels are either costive or relaxed, or easily acted upon by purgatives. All the organic functions are impaired, and the sexual desire suppressed. The patient feels debilitated and fatigued; complains of headache, vertigo, or confusion of ideas; is morose, low-spirited, sluggish, indolent, or incapable of exertion, or of directing his attention long to any object; he readily perspires, and his breathing becomes short and quick on the least exertion. His sleep is unsound and unrefreshing, and he wakens, complaining of lassitude or of pains in his back and limbs. All the cerebro-spinal functions are weakened or disordered. The countenance and skin are unusually pale, sallow, or unhealthy; more rarely red; the eyes are languid and deficient in brilliancy; the breath is fœtid or cool, and the tongue is often loaded, occasionally red or flabby. The urine is sometimes pale and copious, and the cutaneous surface is dry, cool, and harsh or constricted. These symptoms are sometimes so slight as to escape particular attention, and are often insufficient to induce the patient to confine himself. They are frequently much more intense, without being different as to kind; their intensity increasing more or less rapidly, until a sensation of cold running down the back, with formication, chills, or rigours supervene, indicating the approaching development of the malady.

41. When infection is produced by inoculation, the more immediate effects are somewhat differently manifested, according to the nature of the morbific agent; and in those maladies which require a long, precursory period for their full formation, several of the above symptoms are either altogether wanting, or are so slight as to escape detection. In some instances, persons actually infected may complain but little, or may experience merely slight debility, inaptitude for exertion, various dyspeptic symptoms, and depression of spirits. At last, some consecutive or determining influence comes in operation, and the infectious agent, thus re-enforced, soon produces its full effects.

42. In some instances the premonitory period is characterized by remarkable mental depression, by a reserved manner, and by the anticipation of an approaching calamity, or even death. When a person who has been exposed to infectious agents, particularly those which are liable to become epidemic, is possessed with the idea of his impending dissolution, this unfortunate termination generally takes place. This symptom, more, perhaps, than any other, indicates a dangerous functional lesion of the nervous system.

43. *There are various circumstances which favour or retard the development of infection.* Sev-

eral of them have been already noticed (§ 27). Many of those which favour the development of infection not only render the consequent disease much more severe than it would otherwise have been, but also complicate that disease, and impart to it a fatal tendency. Exposure to wet and cold, unpleasant or distressing intelligence, a debauch, excessive fatigue, and exhaustion from any cause during the precursory period, will not only accelerate the effects of infectious agents, but also give rise to inflammation, or congestion, or obstruction of some vital organ. This often occurs in measles, scarlet and typhoid fevers, hooping-cough, smallpox, &c. Dr. Marsh justly remarks that a principal reason of the danger and fatality of fever among medical practitioners is, that during the latent period they make an effort, day after day, to discharge their laborious duties, until at length they are reluctantly compelled to yield, the disease having gathered strength in the same proportion as they have made strong but ineffectual efforts to resist it. A slight illness may be prevented by a strong effort, but a severe one is thereby greatly, often fatally aggravated; and this is not the case merely in respect of fever, but of every malady produced by infection. The circumstances which retard or prevent the development of infection will be considered hereafter, when the pathological views here stated will be applied to practical purposes.

44. VI. The Manner in which Infections and Contagions invade the Economy, and their immediate and direct Effects, have lately excited some discussion. And let it not be supposed that the subject is devoid of importance; for correct views respecting it will lead to the adoption of means for the protection of the system, both at the time of exposure and in the period which more immediately follows it, that will often prove successful in counteracting its earlier effects, or in rendering the course of the disease more mild.—*A.* It is now about twenty years since I endeavoured to show, by anatomical connexions, by functional relations, and by intimate observation of the effects produced by the more energetic morbific agents, that their impression is first made chiefly upon *the organic nervous system*, although the change or effect thereby produced necessarily soon extends to the vascular system, and even to the circulating fluids, and that this takes place when the infectious agent is inserted into a wound, as well as when it is inhaled into the lungs with the air. At the same time, I endeavoured to show that certain agents may more especially affect the circulation by their imbibition or absorption into the blood. This is more especially the case when the infectious agent is received into the alimentary canal with the solid or fluid ingesta, or when it consists of morbid secretions formed in an organ or part admitting of their passage into the circulation. There can be no doubt of the respiratory organs being generally immediately affected by all those agents which are conveyed through the medium of the atmosphere. The cutaneous surface is sufficiently protected from the operation of the impalpable emanations constituting the most common and the most numerous infectious agents. The digestive mucous membrane, although less guarded than the cutaneous surface, is still less exposed than it to their action. It is chiefly, therefore, through the medium of the respiratory surfaces that these agents make their direct impression. On these surfaces the air may be said to undergo a process of digestion, certain elements or portions of it entering in the circulation, combining for a time with the circulating fluids, and promoting their perfect sanguifaction and assimilation; and from those surfaces certain gaseous fluids and elementary principles are given off which have served their purposes in the economy. There is every reason to infer that, during this process, noxious matters floating in the air, or dissolved in the moisture of the atmosphere, produce a morbid impression upon the nerves supplying these surfaces, and upon the respiratory organs generally; and that this impression is more or less rapidly transmitted throughout the organic nervous system, the other organs and general systems of the body, more immediately dependant upon this system, soon manifesting the effects thus produced. At the same time, the noxious emanations, thus conveyed to the lungs in the course of the respiratory functions, most probably affect the condition of the circulating organs and of the blood itself, both these orders of effects taking place co-ordinately, or either of them in a more or less special manner. That certain infectious agents impress the organic nervous system directly and chiefly, is shown by the suddenness of the effects; by the sensations experienced at the time of exposure to those agents, especially to the emanations conveyed in the air; by the sense of constriction and oppression produced in the chest; by the frequent and forcible efforts made to dilate or fill the lungs, as if the impression of the infectious emanation had impaired the vital resiliency of these organs; by the offensive odour frequently perceived at the time of infection; by the sickness, fear, and alarm instantly afterward felt, and by the other phenomena already enumerated.

45. *B.* Next to the impression and change in the nervous system of organic life, the alterations in *the circulating organs and fluids*, consequent upon infection, deserve attention. When infectious effluvia are inhaled into the lungs, the weak action of the heart soon indicates the depression of this system. The impulse of the heart is feeble, slow, or irregular and oppressed. The pulse is weak, soft, compressible, or small—sometimes irregular. It indicates a want of tone; and when the infectious agent has acted with much intensity, absolutely or relatively, the sensation imparted by the artery suggests the idea that the contractility of the coats of the vessel is much impaired. From this defect of the contractility and tone of the blood-vessels arises, during the precursory period of diseases produced by the more energetic infections, the remarkable tendency to congestion of those parts of the circulating system, and of those vessels which are the most removed from the influence of the heart's action. Hence the congestions of the spleen, of the portal vessels and hepatic veins, and of the sinuses within the cranium; and hence the retarded circulation through the lungs, and the fulness of the auricles and sinuses of the heart, giving rise to the sense of

oppression at the præcordia and in the chest, and to the frequent sighing and forced inspirations attending this stage of disorder.

46. The effects produced by infection on the *blood* are not so immediately, or, at least, not so sensibly evinced as those induced in the functions of organs actuated by the organic nervous system. The blood may, however, be affected without the alteration being perceptible to the senses; and changes in the appearances of this fluid are usually visible before alterations in its constitution can be detected by chemical tests or analysis. The pathological conditions of the blood during the earlier stages of the disease consequent upon infection have not been sufficiently observed, and far less satisfactorily investigated. Those which have been described are the results of prolonged or intense morbid action, probably aided, in some cases, by treatment and regimen. I have given, in the article Blood, a full view of those alterations, and explained their sources. But the subject, with all its interest and importance, has not since received any farther elucidation. The state of vital depression, immediately produced by infectious agents, generally precludes the abstraction of blood, and the opportunity of observing its states. I have, however, seen some instances of blood having been taken from a vein during this state, owing to a misinterpretation of the headache, pain at the epigastrium, and oppression at the chest then complained of, and to the epidemic disposition to vascular depletion so prevalent among practitioners, excited and promoted as this disposition was by inexperienced writers, who inflicted their crudities and inanities upon the public, as well as upon the profession, soon after the commencement of the present century. In most of these cases the blood flowed with difficulty, was of a very deep or dark colour, and produced syncope or great depression upon the loss of a few ounces. It coagulated rapidly, and separated into a very dark, large, and soft coagulum, which sunk in the serum, this latter being small in proportion to the clot. In some instances the separation was very imperfect, the coagulum being gelatinous; and occasionally no separation took place, particularly when the powers of life were remarkably depressed. The blood taken at the commencement of the cold stage of agues often presents the same appearances, but generally in a less degree. These appearances indicate rather the vital conditions of this fluid derived from the organic nervous system supplying the vascular system and vital organs than any change in its chemical constitution. It is not probable that the *hæmatosine* is materially altered, or that the saline ingredients and albumen have undergone any diminution, as the circumstances upon which these appearances depend have not been sufficiently long in operation to produce these effects. The *fibrin* is, however, changed or diminished, this substance evincing, by its attraction and cohesion, the state of vital or nervous power. When the fibrin contracts slowly, firmly, and so as to form a firm clot, and allow the free separation of the serum, or to give rise to a buffy or cupped surface of the coagulum, the nervous and vital powers are unimpaired, and vascular action is increased, and generally increased in proportion as this state of the coagulum becomes more remarkable. When, on the other hand, the fibrin adheres quickly but imperfectly; when the attraction between its molecules is weak, and consequently, when either no coagulum is formed, the blood assuming a gelatinous consistence as it cools, or when the coagulum is loose and soft, with merely a slight separation of the serum, this latter either surrounding it in a small quantity, or partially, or altogether covering it, the constitutional powers may be considered as greatly reduced; and, although the circulation may be accelerated, its tone and energy are much impaired, the vital contractility of the coats of the vessels upon their contents presenting a weak *antagonism* to the action of the heart.

47. The occasions on which the blood seems to be more immediately contaminated by infectious agents are, first, when a specific virus or morbid secretion is inserted into a wound, or beneath the cuticle; and, secondly, when putrid or septic matters are similarly applied. The period which elapses between the inoculation of a specific virus and the development of the constitutional affection, however, by no means shows that the immediate operation is upon the blood, and that this period is required for the production of morbid changes in it. If we examine the subject closely, we can arrive at this conclusion only, that the morbid matter affects first the vital conditions and actions, and ultimately the intimate organization of the part to which it is applied, converting the appearances and sensible properties of the part to states somewhat similar to those characterizing itself; and that the contamination thus produced soon extends, either by its immediate effects upon the organic nerves supplying the vessels of the part, and consecutively on the blood, or by the imbibition or absorption of the morbid matter, or by both these channels, to the whole body, affecting more or less the blood, the secretions, and the soft solids. That the organic nervous system is the chief channel by which the first change induced in the part is communicated to the whole body is shown by the circumstance of the constitutional effect being frequently as great while the local change is slight as afterward, when it has become fully developed. Although the precise channel of primary infection cannot easily be demonstrated in cases of infection by inoculation, yet the ultimate effects, as respects both the solids and fluids, are sufficiently apparent. The facts and illustrations contained in the articles Blood (§ 110, *et seq.*) and Fever (§ 18, 526) render farther remark on this topic almost unnecessary. That the blood undergoes, at an earlier or later period of most infectious diseases, a remarkable change as respects its appearance and sensible properties, is sufficiently established. In what the chemical or intimate change may consist has not been shown by analysis.*

* [Under the art. Blood we have given an account from Andral (*Pathological Hæmatology*, Phil., 1844) of the state of the blood in the *pyrexiæ*, which the reader may consult. If fever is not complicated with inflammation, Andral has shown that the fibrin does not augment, that it often remains in normal quantity, and sometimes diminishes to a lower point than we find it in any acute disease. Where the fibrin is much lessened the serum and clot are imperfectly separated from each other, so that there seems to be but little serum in proportion to the clot. In these cases the

that, in the advanced progress of some of these maladies, the saline principles of the blood are either diminished in quantity or altered in their combinations, as shown by Dr. Stevens. Indeed, this may be considered as a necessary consequence of the abstraction, during the disease, of the usual saline substances contained in the food. When the quantity of *chloride of sodium* used by an individual in the twenty-four hours is considered in connexion with the fact that the whole of it passes into the circulation, we must expect a remarkable diminution of this salt, or of its base, in the blood of persons who have been but a few days affected by febrile or infectious maladies. The earliest changes, however, produced upon the blood are manifestly those of its vital conditions.

48. It is very reasonable to suppose that the influence exerted by the organic nervous system upon the circulating organs and vessels throughout their whole extent, and thence upon the contents of these vessels, will alter the appearances and conditions of these contents, as itself becomes altered by the influence of infectious agents; and that the effect thus produced upon the circulating fluids will reciprocate the morbid affection, and heighten disorder in the system more immediately and directly impressed; that, in short, nervous influence, which first experiences the morbid change, in communicating this change to the vascular system and circulating fluids, soon undergoes a farther alteration, owing to the changes it has itself produced in these fluids. In some instances, however, and especially when putrid matters are applied to a wound, a more rapid contamination of the circulating fluids may be inferred. When these matters, or when morbid secretions, or blood in an advanced period of malignant or putrid diseases, are injected into the circulation, it is but reasonable to infer that the effects will be more immediate, and that they will be in most respects similar to the morbid conditions characterizing the advanced stages of the malignant or putro-adynamic maladies produced by self-perpetuating infections or contagions. The interesting experiments of Gaspard, Magendie, Leuret, and Hammond have fully established the truth of these inferences, as shown in the article just referred to.

49. *C.* The morbid impression made upon the organic nervous system and the change induced upon the circulating organs by infectious agents necessarily *affect the secretions and excretions.* As the secreting and excreting organs are actuated chiefly by the organic nervous system, and as the vital manifestations of this system are remarkably depressed by infectious agents, the functions of these organs must consequently be more or less impaired soon after infection. It is chiefly owing to this circumstance that the blood becomes altered in the progress of infectious diseases. In the article already noticed, I have fully shown that the imperfect performance of the functions of depuration is a chief cause of the morbid states of the blood; and that, as these functions are impaired in proportion as vital power is diminished, so must the secretions and excretions be disordered both in the early and in the advanced stages of infectious maladies. In the former of these stages, even the period of premonition, the disorder of these functions is often manifest, but they are diminished rather than vitiated. In the advanced stages, they are prominently vitiated as well as diminished; and sometimes, even when the vitiation is most remarkable, they are sufficiently abundant, or even remarkably copious.

50. *D.* The *alterations produced in the soft solids by infection* are the latest in the procession of the consequent morbid phenomena, and vary remarkably with the nature of the infectious agent. Some of those agents produce certain determinate or specific effects upon the tissues. Thus the effluvium of smallpox affects the skin and mucous surfaces especially; that of scarlet fever, the throat, digestive mucous surface, skin, and the membranes of the brain; that of measles, the respiratory and cutaneous surfaces, &c.; that of plague, the lymphatic system and glandular organs; that of erysipelas, the integuments and cellular tissue; that of syphilis, the absorbent glands, the periosteum, the skin, bones, and joints; and so on, as respects most kinds of infectious diseases. These alterations are, however, much modified, or additional lesions are developed, by consecutive changes or influences; by the temperament, predisposition, or previous disorder of the patient, or even by the treatment, as when certain complications appear from these or other circumstances, at the commencement or during the course of infectious fevers. Among the changes induced in the soft solids by infectious agents, the most important, and evidently the most intimately dependant upon the state of vital manifestation, and the conditions of the circulating and secreted fluids, are the discoloration and the softening of membranous and parenchymatous structures. This discoloration and softening, as observed soon after death, are perfectly independent of incipient dissolution of the tissues, and are generally great in proportion as the infectious or contagious nature of the agent is remarkable. The general loss of the vital cohesion of the tissues is often so great that even the most firm and coherent structures are torn with ease, the substance of the heart and muscular parts also participating in the change. (See art. Fevers, § 527.)

51. VII. The Circumstances which favour Infection are numerous, and it is of importance that they should be recognised and well understood by the physician. These circumstances may be grouped, first, into those which are *intrinsic*, which concern the individual, or are proper to the recipient; secondly, into those which are *extrinsic*, or which concur or co-operate with the infectious agent.—*a.* The circumstances proper to the recipient of infection are numerous, but the chief only of them can here receive particular notice. There is a *susceptibility* to infection from birth, which, in respect to some infections, diminishes with age, or is entirely exhausted or destroyed by the disease which it produces. This destruction of the susceptibility to infection is remarkable

clot is voluminous, often filling the whole breadth of the vessel in which it is received; of slight consistence, and easily reduced to a fluid pulp; never elevated at its borders, and often divided into a number of grumous portions, which mix with the serum and colour it of a more or less deep red. The large size of the clot is not alone owing to a diminution of contractile power from lessening of the quantity of fibrin, but also to the comparatively large proportion of globules it contains.]

as regards the exanthematic contagions, yellow fever, and hooping-cough; and although it is not universal, yet the exceptions are very rare. In certain infectious maladies, as continued and typhoid fevers, the susceptibility increases with the progress to puberty, and diminishes gradually from the twenty-fifth or twenty-seventh year to old age. The danger, however, increases with this diminution, if infection actually takes place. Although typhoid fevers do not entirely exhaust the susceptibility to their infection, they manifestly weaken it. When a person has escaped infection, upon the first or the earlier exposures to several infectious maladies, he will generally continue to possess an immunity, unless circumstances should occur to increase his predisposition; for the infectious emanation produces a more sensible and marked effect on the economy, on the first occasion of exposure to it, than subsequently, unless long intervals have elapsed between the periods of exposure. It is thus that several members of the same family so often escape, notwithstanding the rest are labouring under infectious maladies, the susceptibility to them diminishing with the frequency of exposure, unless concurrent causes or influences re-enforce the infecting agent.

52. The kind of susceptibility which disposes to infection varies much with different infectious maladies. In some, as typhoid fevers, youth and the prime of life are predisposing circumstances; and yet, fear of the disease, fatigue, exhaustion, and other causes altogether of an opposite character, have a similar influence, and concur with it. In others, as yellow fever, the seasoning, pernicious, and malignant fevers of warm climates, persons in the prime of life, and of the most robust and plethoric constitutions, are the most liable to infection; while remittents and agues usually affect, in preference, the more debilitated, and persons of a weaker and more delicate frame. Most of the maladies which are capable of propagating themselves exhaust the susceptibility to reinfection. The chief exceptions to this are, venereal affections, plague, and purulent ophthalmia; whereas, the infections which are incapable of propagating themselves, unless other causes be superadded, particularly those which consist principally of emanations from decayed vegetable products, leave after them an increased disposition to reinfection. A person who has once had an attack of periodic fever is more susceptible of infection upon exposure to malaria, and a smaller dose of the poison will take effect.

53. Of the other sources of susceptibility to infection, the most important are, fear and the depressing passions, disorder of the digestive organs, general ill health, and whatever impairs the powers of life. All infectious agents produce a morbid impression on the nervous system, and contaminate the circulating and secreted fluids with a rapidity, and to an extent, *cæteris paribus*, according to the weakness of vital power and resistance. When the nervous influence and vascular tone and action are insufficient to oppose these agents, the infection then takes effect; the morbid influence extends; the circulating fluids are either early contaminated or soon become deteriorated; and thus the whole frame is brought, not only under the influence of, but is actually polluted by the disease.

54. There are other circumstances which predispose to or increase the susceptibility of infection, but they are so well known, in respect both of their nature and modes of operation, that they need not be noticed at this place. They are chiefly *extrinsic* to the body; and either precede, or are nearly coetaneous in their action with the infectious agent. Those which *subsequently come in aid* of this agent, and aggravate, modify, and complicate its mode of operation and effects, have already been alluded to (§ 27). They will be found more fully discussed in the articles Disease (§ 61), and Endemic and Epidemic Influences.

55. VIII. The Means which protect from Infection, and counteract its Impression and Operation, are of the greatest importance, as respects both the science of the physician and the safety of the community. These measures may be divided into: 1st. Those which protect by excluding and destroying infectious agents, or by preventing communication with infectious persons or things; and, 2dly, Those which are prophylactic, and which guard or fortify the individual against the impression or contamination of infections and contagions. *The first of these classes of preservative means may be subdivided into*, 1. Quarantine, and the separation of the infected from the healthy; 2. The exclusion of infected articles, or the destruction of all infection existing in them; and, 3. The dilution and destruction of the infections floating in the air, or in any other medium.

56. *A. The separation of the infected from the healthy* is the chief means by which a distemper can be prevented from extending. This can be enforced only by governments and local authorities, when a pestilential or infectious epidemic threatens a country or district. To the neglect or imperfect accomplishment of the measures which belong to quarantine is chiefly to be imputed the extension of pestilential maladies, particularly in countries bordering on the Mediterranean. The difficulty, however, of putting these measures in force, and the facilities of evading them, especially by the transmission of infected clothes and other fomites, and as regards Continental countries having an extended boundary, or populous cities or towns having an extensive communication, are so great, that numerous instances of their infraction must occur, and the chances of the introduction of these maladies be thereby increased. The extension of plague, yellow fever, and pestilential cholera in different countries, has been entirely owing to the neglect of quarantine and of other means of prevention. If these means could be duly enforced in all their relations, not only those, but other infectious maladies, as typhoid fevers and smallpox, might be either entirely excluded from certain localities, or remarkably limited in their spread, particularly where the situation and boundaries of a place favour the application of these means.*

57. Next to the exclusion of infected persons or things from a place, the removal of those first infected to suitable places, where they may be properly treated, and where the exten-

* [For some remarks on quarantine as connected with yellow fever in the United States, see arts. Yellow Fever and Pestilential Cholera.]

sion of the disease is duly guarded against, is of importance. The habitations of infected persons should undergo the processes of cleansing, fumigation, &c., about to be noticed; and all intercourse between the infected house and those adjoining ought to be prevented, or placed under certain restrictions. In large commercial towns, and in populous districts, where a strict quarantine or sanatory measures, calculated entirely to prevent a malady from extending, cannot be maintained, the mischief resulting from the attempt will be greater than the benefits which will arise to the community. But where they may be enforced, owing to the nature of the locality and other circumstances favourable to their due maintenance, they should be adopted, notwithstanding the temporary losses, or even distresses of the place thus sequestered; for the advantages of the few should give place to the safety of the many.

58. As intimately connected with all regulations of quarantine and seclusion, *the duration of the period which elapses from the impression of the infectious agent to the development of the disease* should be taken into consideration. On this subject, the information which I have attempted to give (§ 29) will be found useful. It is obvious that a person may be exposed to a source of infection in one place, and may travel a long distance during the period of formative or smouldering action, and not experience the developed malady until after his arrival in a healthy locality, where he may introduce the infection. In the present day of rapid conveyance, a person may carry an infectious malady, which he has caught in London, to any of the remotest parts of the kingdom, or from almost any European country to this.

59. It is of no less importance to know *the time which a person who has been ill of disease capable of transmission from one to another, retains the power of infection;* but this is a matter of still greater difficulty, even, than the knowledge of the duration of the precursory period. The body itself, probably, loses the power of transmitting a malady as soon as convalescence is so far established as to admit of free exercise in the open air. Probably a fortnight after the commencement of recovery from most infectious maladies, the power of spreading them has ceased. Where a disease has been communicated at so late a period as this, there is every reason to suppose that the clothes have been concerned in its communication. It is, however, most difficult to assign a precise period with reference to any infectious malady, as its duration will entirely depend upon the personal habits of the individual, upon the ventilation and means of purification resorted to during illness as well as during convalescence, and upon the care taken with his clothes and person. Among the lower classes, infection probably continues longer to attach itself to the person than the period now named, owing to circumstances peculiar to them; and there is every reason to believe that it may continue in their apartments or dwellings even weeks and months afterward, unless disinfecting means be carefully employed.

60. *B.* In many situations, and in several distempers, *the chances of infection by fomites* are much greater than by communication with the sick. Articles of bedding, feathers, furs, body-clothes, &c., which have imbibed the effluvium of the affected, readily transmit most of the infectious diseases of this country, as well as the pestilential maladies of other countries, to very distant parts. It is astonishing how long woollen and silken bed and body clothes will retain the effluvium, so as to affect the healthy by it, when closely packed together, or excluded from ventilation. The animal miasm which the clothes worn in dissecting rooms have imbibed will be sensibly perceived many months afterward, if they have been put in a close place immediately after they were saturated with the foul air. The necessity of subjecting these articles to ablution, to free ventilation, and to other means of purification, is sufficiently obvious; but by the lower classes, and even by other persons, all precautionary measures, even those which merely consist of common cleanliness, are most flagitiously neglected, although among them those measures are the most requisite. The crowded, low, close, and dirty state of their apartments, and the neglect of ventilation by them in all circumstances, and especially during disease, demand a stricter enforcement of purification or disinfection among them than elsewhere. Before articles from them or other infected sources are introduced among healthy predisposed persons, they should be subjected to the disinfecting agents about to be noticed, and to the perflation of the air in suitable situations, or in places from which the public are excluded.

61. *C. Disinfection.*—During the continuance of an infectious malady in a family or place, it is the duty of the inmates of the one, and of the authorities of the other, to put in force certain *measures of disinfection;* particularly when, owing to the general prevalence or nature of the malady, it may not be deemed requisite to remove the sick to places suitable for their seclusion and treatment. In all circumstances, however, disinfecting means should be employed, as tending not only to protect the healthy, but also to aid the infected; for it is obvious that it is much to the advantage of the latter to have the air and clothes in which they are confined frequently renewed, and the morbid effluvium removed or counteracted, than to be subject to its concentrated influence during the course of the malady. To dilute, therefore, or to destroy the infections floating in the air, or attached to any other medium, is a duty we owe both to the sick and to the healthy.

62. *a.* Among disinfecting means, a *perflation of pure, dry air*, and the abstraction of all sources of humidity, are the most universally beneficial and applicable. These alone prevent several maladies, particularly those which proceed from the sources of infection ranged under the first and second classes of these agents (§ 4), from propagating themselves; and when they can be fully enforced, they prevent the extension of most of those distempers which always proceed from specific infection and contagion. Whatever may be the sources of the morbid effluvium or emanation, dilution by a free ventilation will either weaken or destroy it—at least so far as to cause it to fail to produce its usual effects. This result will be more certainly obtained when the air is dry. High ranges of temperature, by increasing the humidity of the atmosphere, favour infection, if a

very free ventilation is not preserved; and cold, although preventing infection when there is a free circulation of air, often also promotes it, owing to the means used to prevent currents of cold air. This is frequently evinced by the evolution or propagation of infectious diseases in the close wards of hospitals and other places during winter and spring.

63. *b. Various means* have been resorted to for *the destruction or neutralization of infectious emanations*, especially during the prevalence of destructive epidemics or pestilences. In the desire to establish the efficacy of recently-introduced disinfectants, the older means have been undeservedly depreciated. Although the former are the most efficacious, yet it follows not that the latter were devoid of all disinfecting powers. The advantages derived in former times from *fumigations* by camphor, benzoin, myrrh, tar, and terebinthinate substances, and by numerous aromatic, fragrant, and stimulating drugs, were owing to more than one circumstance. These means not only inspired those who used them with confidence, but also in some measure neutralized the operation of the infectious emanation. The fumes from them, and from other exciting and fragrant substances, often counteracted the impression made by the morbid emanation upon the nervous system, by preventing the depression it otherwise would have produced. On this account, they may still be resorted to with advantage in some circumstances, particularly in cases of casual or short exposure to infectious emanations, or when it is desired to counteract those which are the less virulent and not generally diffused. When judiciously employed, many of these substances aid the recovery of the sick, especially when the disease is attended by much depression of vital power. Until the discovery of Labarraque's disinfecting fluid, and of the uses of the chloride of lime, they were the chief means that could be employed in the chambers of the sick; those which are next to be noticed being, from their acrimony, suited chiefly to uninhabited houses.

64. *c. Acids* have long been in use as disinfecting agents, under the impression that they possess the property of decomposing infectious emanations, or at least of diminishing their virulence. With this idea, the once popular nostrum, well known under the name of "*Thieves' vinegar*," was brought into notice, and even at the present day, under the name of "*Aromatic vinegar*," it is much used by persons exposed to infection, and, I believe, often with advantage. Letters and papers brought from an infected locality are not infrequently dipped in *vinegar*; while clothes and other fomites, transmitted from a similar source of infection, are exposed to the fumes arising from the slow combustion of sulphur, or, in other words, to the action of *sulphurous acid*; but as this latter is found to be injurious to the respiratory organs, and as the powers of the former are too weak to be relied upon when acids are indicated for the purpose of disinfection, the *nitrous* and the *hydrochloric* are those principally used, although not without some risk to the inhabitants of the apartments subjected to their action. *Nitrous acid* was first employed by Dr. Johnstone and Dr. Carmichael Smyth. The latter, however, obtained the parliamentary grant for the disputed discovery, and in 1780 employed this acid to arrest the progress of a fever which was then raging at Winchester, among the Spanish prisoners confined in that city; and subsequently numerous ships and hospitals, which had become the seat of infection, were exposed to the same agent with success. It may easily be obtained by the combination of nitre and sulphuric acid in proper proportions; and it possesses the advantage of not requiring the aid of heat to effect the development of its fumes.

65. *Hydrochloric acid* was introduced in 1773, by Guyton Morveau, for the purpose of purifying the principal church at Dijon, the emanations from the crowded vaults below having so infected the air of the building as to render it unfit for public service. This acid was soon afterward employed with a similar intention in the prison of the same city; and its success in this case also served to establish its reputation. But the application of heat is necessary to procure the evolution of the fumes with rapidity, from the substances from which it is usually prepared. As its use is not without some danger to animal life, it is desirable that no heat should be applied when it is employed to disinfect inhabited apartments, and that the process should be allowed to go on slowly. But, however great may have been the reputation of both the nitrous and hydrochloric acids in times past, they are rarely used in the present day, both being compelled to yield to chlorine.

66. *d. Chlorine* was first brought into notice as a disinfecting agent by M. Fourcroy, in 1791; and was subsequently employed as such, on various occasions, by Mr. Cruikshank, of Woolwich, and by M. Guyton Morveau. It has since been used by Dr. Faraday for the purification of the Milbank Penitentiary, an account of which was published by this celebrated chemist, in the 18th volume of the *Journal of Sciences and the Arts*. Chlorine, for the purpose of fumigating, is most readily and usually obtained, as is well known, by mixing chloride of sodium and the peroxide of manganese, and adding to them a due proportion of sulphuric acid; but as it is extremely irritating to the membrane lining the bronchi and the air-cells of the lungs, when evolved in any considerable quantity, and as it is hence totally inapplicable to inhabited apartments or wards of hospitals, the above process is entirely unavailable on these occasions. To obviate this inconvenience, M. Guyton Morveau introduced a very ingenious apparatus, by which the issue of gas could be regulated at pleasure; but this and all other processes have been altogether superseded by the introduction, by M. Labarraque, of the *chloride of lime* and *chlorinated soda*. There has been, indeed, much discussion as to the chemical nature of these compounds, but this is a subject not requiring notice here; practically it is of far greater importance to know that they are most powerful disinfectants, and that their success has been unequivocal in the most varied cases wherein the use of these agents are indicated. M. Labarraque recommends the *chloride of lime* as the substance best adapted for infected apartments, and considers the *chlorinated soda* as more applicable to foul wounds, ulcers, &c. Both these substances, however, possess the

property of preventing infection or putrefaction, and of arresting it when it has commenced [probably by decomposing *ammoniacal* and *hydrosulphuric gases*, which, there is reason to believe, are developed on these occasions]; and they may both be used with perfect safety in sick chambers, in the wards of hospitals, and in prisons and other inhabited places. When it is desired to purify any of these apartments, portions of linen steeped in the solution should be hung in various places about the room, and the floor and walls frequently and freely sprinkled with it. Some persons, however, with more nicety than discretion, object to the use of these substances, in consequence of the unpleasant odour of chlorine, which they declare to be equally or more offensive than that of the infectious effluvium; but it should be borne in mind that the existence of the latter is pregnant with danger to those exposed to it, while, in the diffusion of chlorine by means of these liquids, there is nothing pernicious to life.

[PARIS states (*Pharmacologia*, Am. ed., p. 196) that, in the midst of the dreadful contagion that raged in Spain, the inhabitants always escaped in those houses in which fumigation of chlorine had been used, and that, during the epidemic fever that raged over Ireland from 1816 to 1819, the persons employed in the chemical manufactory at Belfast, which contained in its atmosphere a considerable quantity of *chlorine*, were wholly exempt.

Prof. DANIEL has recently suggested (*Lond. Phil. Mag.*, 3d ser., No. 121, July, 1841) that the sulphuretted hydrogen which abounds in the waters of the African Seas is the true cause of the endemic fevers of that country, or, in other words, the true *malaria*. He has shown, by numerous experiments, that decaying organic matter has the property of decomposing sulphuric salts, and of developing sulphuretted hydrogen; and he accounts for the presence of this gas on the African Coast by the mutual reaction of the immense quantities of vegetable matters which must be brought down by the intertropical rivers and the *sulphates* of the sea-water. It was in consequence of this Report that the British Admiralty gave directions for affording to a ship, about to sail to Africa, the means of producing and applying the antidote, CHLORINE. It is by no means, however, proved that sulphuretted hydrogen is the cause of malignant bilious remittents and intermittents; indeed, the theory has already been abandoned by many who at first adopted it, and is, in fact, unsustainable in the present state of our knowledge.]

67. Besides cleansing the air, chlorine, and all other purifying fumigations, will have a similar effect on the various solid substances and articles of furniture in the infected apartment. It is prudent, however, in addition to the employment of the above measures, to wash these substances well with soap and water; and as soon as the patient can be removed, the walls of the apartment should be whitewashed, and the room be well and freely ventilated prior to its being again inhabited. All bed and body clothes, removed from a patient labouring under an infectious disorder, should be at once immersed in hot water, or in a solution of an alkaline lye; and after being soaked in either for a considerable time, they should be subsequently hung out in the open air, and occasionally sprinkled with the chlorinated solution. It must not be forgotten that the beneficial effect of chlorine will be exerted only on a limited quantity of air, and that it is by no means sufficient to correct any epidemic taint existing in the atmosphere of a district or place. When employed, however, in a limited atmosphere, this and other disinfectants have proved of no small advantage in checking the spread of infectious maladies; but the power which they possess is far from being sufficient to preclude the necessity of avoiding unnecessary exposure to the sources of contagion, and of adopting preventive and precautionary measures.

68. *e.* In addition to the forementioned means, an *elevated temperature* has been recommended by Dr. HENRY, as a powerful means of disinfecting fomites, or substances imbued with infectious emanations. The effect of heat has been principally tried in cases of *typhus* and *scarlatina*; and although its power to destroy the infectious properties of the effluvia produced by typhus may be questioned, yet the experiments of Dr. HENRY prove that the emanations of *scarlatina* are decomposed or dissipated by exposure, for an hour at least, to a temperature of 200°. And it must be acknowledged that, where heat is of itself sufficient to exert a beneficial influence upon infected clothing and other fomites, it is preferable, for this purpose, to chlorine or any other fumigation, being more easily and more extensively diffused throughout the whole of the substances conveying infection. Its use is, however, limited to bed and body clothes, to trunks and packages, and other articles capable of imbibing and retaining the morbid emanation.

[It is reported of HIPPOCRATES that, like ACRON of Agrigentum, he changed the morbific state of the atmosphere at Athens by kindling fires (GALEN, *Therap. ad Pison*; AETIUS, v. 94). ACRON's method of purifying the atmosphere is mentioned by PLUTARCH (*de Iside et Osiride*). For an account of ACRON, see FABRICII (*Biblioth. Graec.*, xiii., 32); CONRINGII (*Introduct.*), and MANGETI (*Bibl. Med.*). PLINY says of fire as a corrective of the state of the atmosphere, "Est et ipsis ignibus medica vis. Pestilentiæ, quæ solis obscuratione contrahitur, ignis suffitu multiformiter auxiliari, certum est, EMPEDOCLES et HIPPOCRATES id demonstravere diversis locis" (*H. N.*, xxxvi., 69). With the same intention, SIMEON SETH proposes fumigations with frankincense. The historian HERODIAN relates that fumigations with aromatics were recommended as a preventive of the plague. (See ADAMS's *Com.* in PAULUS ÆGINETA.)]

69. IX. PRECAUTIONS AGAINST INFECTION.—Every rational measure to avoid exposure to the infectious effluvia, whether emanating immediately from the bodies of the affected, or mediately from other sources, should be resorted to. Under this head, as strict seclusion as possible, and shunning intercourse with those most likely to have been among the infected, are deserving of attention. The predisposing and concurrent causes of DISEASE (see the article, § 23, *et seq.*, 61) should be carefully avoided. Whatever tends, directly or in-

directly, to debilitate or fatigue the body; whatever lowers its vital energy, as excesses of every description, low and unwholesome diet, and insufficient clothing, disposes to the operation of the exciting causes of infectious maladies. On the other hand, whatever tends to support this energy, and preserve in their due regularity the healthy functions of the frame, serves to render it impregnable to infectious agents. Exposure to cold, to chills, to the night dew, to wet and moisture; the use of cold fluids, and of cold, flatulent, and unripe fruits, should be carefully avoided. If, at any time, exposure to the night air or to cold and moisture is inevitable, the system should be fortified against them; but the mode of doing this requires caution. It should not be attempted, unless when better means are not within reach, by wines or spirits, and, even then, these should be used in very moderate quantity, otherwise they will leave the system, as soon as their stimulating effects have passed off, more exposed than before to the invasion of infectious effluvia. Medicinal tonics and restoratives, however—and those more especially which determine the circulation to the surface of the body, at the same time that they improve the tone of the digestive organs, and promote the regular functions of the bowels and biliary system—may be resorted to on such occasions. For this purpose, the infusions or decoctions of bark, of cascarilla, of calumba, &c., with the spirits of Mindererus, or any warm stomachic medicine, or the powdered bark, or the sulphate of quinine, or the balsams, may be taken either alone or with camphor, or with the aloes and myrrh pill, and any one of the spicy aromatics. These medicinal means are especially called for whenever an infectious malady, of which the individual is susceptible, is present in a town or house in which the person resides; and they should be had recourse to when he retires to sleep, and in the morning before he leaves his room. He should, moreover, avoid sleeping in low and ill-ventilated apartments, and be equally distrustful of sleeping near, or even of passing through in the night-time close and unwholesome situations and streets, particularly without having resorted to the medicinal means now suggested. (See art. Endemic Influences.)

70. Care should be taken never to be exposed to the morning or night air with an empty stomach. A cup or two of coffee and bread, previous to such exposures, will be serviceable. The stomach and bowels should be always attended to, and their functions regulated and carefully assisted; but in no case should these objects be attempted by cold, debilitating medicines, such as sulphate of magnesia, or other saline purgatives. The warm stomachic laxatives, or those combined with tonics, may be adopted with advantage, as occasion may require.

71. Particular attention ought to be paid to *personal* and *domestic cleanliness*. The surface of the body should be kept in its natural and perspirable state. The constant use of flannel nearest the skin will be serviceable for this purpose. Excessive perspirations ought to be avoided.

72. The *diet* should be regular, moderate, nutritious, and easy of digestion. While every approach to low living should be shunned, its opposite ought never to be indulged in. The stomach should have no more to do than what it can perfectly accomplish without fatigue to itself, but to the promotion of its own energies. It must never be roused to a state of injurious excitement by palatable excitants, nor weakened by over-distention, or too copious draughts of cold, relaxing diluents.

73. The *state of the mind* also requires judicious regulation. It ought never to be excited much above nor lowered beneath its usual tenour. The imagination must not be allowed for a moment to dwell upon the painful considerations which the disease is calculated to bring before the mind, and least of all ought the *dread* of it to be encouraged. There is a moral courage sometimes possessed by individuals who are the weakest, perhaps, as respects physical powers, enabling them to resist more efficiently the causes of infectious and epidemic diseases than the bodily powers of the strongest, who are not endowed with this form of mental energy. Those who dread not attacks of diseases, and who yet exercise sufficient prudence in avoiding unnecessary exposure to their predisposing and exciting causes, may justly be considered as subject to comparatively little risk from them. On all occasions, however, a foolhardy contempt or neglect of ailments, especially those affecting the stomach and bowels, ought to be guarded against.

74. During the occurrence of infectious diseases in a family, these precautions are still more imperatively required. A free *ventilation* of every apartment ought to be constantly observed, in conjunction with *fumigations* by means of aromatic substances kept slowly burning, or by the vapours of chlorinated soda or chloride of lime. If a quantity of a very weak solution of chloride of lime be put in a vessel, and some hydrochloric acid be poured upon it, and be placed in the hall, or the very lowest parts in a house, the disengaged gas will soon find its way in sufficient quantity to the higher apartments. The attendants on the sick should particularly observe the measures now prescribed, and ought never to exert their attentions on the affected so near their persons as to inhale their breath, or the effluvium emanating from them, without at least fortifying the vital energies in the way pointed out; and they should carefully avoid entering upon those duties with an empty stomach, or when fatigued.

[*Tobacco* was formerly in high repute as a prophylactic against infection, and the crews of British vessels were required to smoke, at certain hours of the day, to guard against its invasion. Dr. Dickson (*Essays on Pathology and Therapeutics*, &c. Charleston, S. C., 2 vols. 8vo, 1845) thinks that the *cigar* would promise more benefit than the odour of vinegar, camphor, &c., if the inlet of contagion were by the deglutition of saliva, as has been imagined of *malaria* and certain other causes of disease; but he thinks this has not been made out, and is therefore incredulous as to the utility of tobacco thus employed.]

75. Besides burning warm aromatic substances and odoriferous gum-resins in the apartments, and in those adjoining them in which affected persons are or have been confined, so

lutions of chlorinated soda, or of the chloride of lime, or a saturated solution of camphor in aromatic vinegar, or in the pyroligneous acid, should be occasionally sprinkled on the floors, furniture, and bed-clothes. These means, with a thorough ventilation and a due attention to cleanliness, will not only counteract the influence of the effluvium proceeding from the affected, and ward off its action even on the predisposed, but will also prevent the clothes, bedding, or furniture of the apartments of the sick and the clothes of the attendants from becoming imbued with it so as to communicate the malady. They are within the reach nearly of all; and in the event of the extension of a pestilential infection or epidemic to any considerable town or city, if care were taken to see them put in practice, under the direction of medical councils of health, one of which should be formed in each district or quarter, much good would result from them. Keeping in recollection the principle which I have endeavoured to establish—that the exciting cause of infection undoubtedly makes the first impression on the nerves of the lungs—the advantages of those measures, from the circumstance of their being applied especially to this organ, must be obvious.

[Besides acriform bodies, which decompose or neutralize noxious effluvia by diffusing themselves through the atmosphere, there are solid bodies also which may be usefully employed in effecting the same object. Such is *quicklime*, which, from its strong attraction for carbonic acid, is highly useful in removing from cellars, wells, and other confined places, the fixed air which may have accumulated, and which is so destructive to human life. If *sand* be submitted to a red heat, so as to drive off any adhering matter, it will, after having been exposed to a tainted atmosphere, yield ammoniacal fumes, showing that it must have absorbed effluvia during its exposure. Hence the importance of freshly whitewashing infected apartments, and frequently sprinkling the floors with sand that has been heated.]

76. When a contagious substance has been accidentally applied to a wounded or to an abraided part, means to prevent its absorption or contaminating influence should be instantly resorted to, appropriately to the situation and to the nature of the contagious principle. Ligatures above the seat of injury and suction of the part should be instantly employed; and ablution with a strong acid solution—with muriatic and nitric acids, or with both—the application of spirits of turpentine, of the nitrate of silver in substance, or in a strong solution, and similar measures, ought subsequently to be adopted. In cases of the inoculation of the virus of *rabies*, excision of the injured part should precede these means when it can be performed.*

* [Dr. STEVENS states that common salt is an antidote to the poison of the rattlesnake. When an Indian is bitten, he tells us that he applies a ligature above the part, and scarifies the wound to the very bottom; after which he stuffs it with common salt; and he adds, that the wound soon heals without any ill effects on the system. It is customary among the Indians and traders, in the northwest coasts of our country, when bitten by the rattlesnake, to employ the ligature, scarify the part with a knife or flint, rub some gunpowder into the wound, and, making a conical mass of the same material, moistened, over the seat of injury, set it on fire. This proves a very effectual kind of *moxa*, and is rarely followed by any untoward circumstances.]

At the same time, the promotion of the digestive functions and of the constitutional powers, by the treatment already advised, will materially aid the local applications in preventing the development of disease.

[All these measures are valuable; but our first aim should be, if possible, to remove the infectious cause. If it be animal or vegetable matter in a state of putrefaction, these are to be promptly removed, if possible. The best counter-agents of contagion are cleanliness, ventilation, and abundant washing; walls and ceilings of houses should be thoroughly whitewashed, and heated sand sprinkled over the floors; chlorine, however, gradually disengaged, is never to be neglected where causes of infection are permanent.]

77. X. TREATMENT WHEN SYMPTOMS OF INFECTION APPEAR.—When a person has been exposed to the sources of infection, and particularly when the symptoms I have described indicate that infection has actually taken place, and that the disease is in the course of development, *are* there any means which will prevent its evolution, or render its course more mild if prevention cannot be accomplished? I believe that a treatment may be adopted which will often succeed in preventing or in mitigating the disease; and that these ends will frequently be attained in respect of several infectious maladies. There are some, however, which cannot be arrested after infection has taken place, or after the symptoms characterizing the formative or precursory stage have appeared. Small-pox, and probably plague, scarlet fever, and measles, seem to be the chief maladies which may not be prevented from developing themselves after infection has made the full morbid impression on the economy.

78. In order to arrest the progress of infection, it is necessary to keep in recollection the conclusions as to the operation of infectious agents on the system that may reasonably be drawn from observations both pathological and experimental. These conclusions, as furnishing a basis for remedial indications, may be limited to the following: 1st. That the *more immediate impression* of infections is made upon the nervous system of organic life. 2d. That this impression is of a sedative or *depressive* kind. 3d. That infectious agents not only *depress*, but also *modify* or *alter* the vital influence in a special manner, or, in other words, each infectious agent produces a peculiar or specific depressing effect. 4th. That the vascular system and circulating fluids soon experience the effects of this impression; and that the action of certain infections and contagions is earlier displayed on this system in respect of some contagions than as regards others. 5th. That the circulating, secreted, and excreted fluids undergo a consecutive and progressive change. 6th. That the impression on the organic nervous and vascular systems, and the consecutive changes in the fluids, ultimately affect and impair the vital constitution and cohesion of the soft solids. 7th. That, as an infectious agent exerts a depressing or sedative, as well as a special or peculiar morbid impression, it is reasonable to infer that whatever tends to increase the nervous power will enable the energies of life to resist the morbid impression, to prevent the progress of contamination, and

often ultimately to remove both their immediate and remote effects.

79. Conformably with these views, I have, on numerous occasions of exposure to infectious agents, advised a *restorative* and *tonic treatment*, with strict attention to the *prophylactic means* just advised. These should be continued for a period at least equal to, and in most cases beyond that which is required for the development of the disease. In many instances this treatment should be preceded by an *emetic*, which may be conjoined with some warm or stimulating substance. A warm *stomachic purgative* should afterward be exhibited; and hot diluents, with camphorated or aromatic substances, may also be given. The energies of life ought to be promoted by means suited to the habits and circumstances of the individual, particularly by tonics, or light, nutritious diet, and pure, dry air. When the infectious agent produces, at the period of exposure to it, a sensibly depressing and morbid operation, it will be often of service to excite, as soon as possible, an artificial febrile commotion in the system, and to promote the secretions and excretions. The excitement will overcome the depressing effects, and the promotion of the secretions and excretions will preserve the blood in an uncontaminated state. Much, however, will depend upon the employment of the means appropriately to the condition and circumstances of the infected person.

80. When the primary operation of infectious agents is characterized by great vital depression, it is surprising how large doses of tonic and restorative substances may be taken before this state is removed. A lady of a delicate constitution, usually unable to take more than two glasses of wine after dinner without occasioning heat and discomfort, was exposed to concentrated effluvia of the exanthematic typhus now prevalent. She felt an unpleasant odour, followed by a sudden loss of strength, nausea, and all the symptoms indicative of infection in a severe form. Her spirits were depressed; she stated her conviction that she had caught the infection, although she had approached it without any dread; gave directions as to her affairs, and resigned herself to her bed. I found her with a weak, irregular pulse, slow, and very compressible. The countenance was very pallid, and the mental and corporeal depression was extreme. I prescribed camphor in the form of pill, and the decoction of cinchona with the compound tincture, the tincture of capsicum, the chlorate of potash, and carbonate of soda in full and frequent doses. In the intervals, wine was given freely in the form of negus, a bottle being taken in the twenty-four hours in this form. These means were persisted in for two days before the powers of life rallied; when a free and general perspiration broke out, and restoration quickly took place.

81. Of four persons who were exposed to the concentrated emanations of typhus, three of them were seen by me soon afterward, owing to the appearance of symptoms of infection. They were all treated upon the same principles; sulphate of quinine and camphor in full doses, and as much purified extract of aloes as was necessary to keep the bowels open, were given every three or four hours in two of these cases. The three thus treated soon ceased to experience the precursory symptoms. The fourth of these exposed persons was an aged female, and hence much less susceptible of typhus infection than the three young persons who had evidently caught the infection. She escaped, but carried the infection to her son and daughter. I might adduce numerous other proofs of the success of treatment during the period which elapses from exposure to infection till the full evolution of its effects, if my limits could admit them. But I have advanced enough to show that appropriate means will often succeed in preventing the most severe and dangerous consequences, both to the person who has been exposed to infection and to him who is experiencing its incipient or earlier effects. (*The above article is the substance of the Gulstonian Lectures, delivered by the author at the Royal College of Physicians in May*, 1838.)

BIBLIOG. AND REFER.—i. OF INFECTION GENERALLY.—*Thucydides*, ii., 48, p. 226, ed. Bauer.—*Aristotle*, Problem. i., 7; problem. vii., 4; et problem. vii., 8, p. 551, ed. Casaub., fol.—*Dionysius Halicarnassensis*, Antiq. Roman., ix., 42, p. 572, ed. Oxon., fol.—*Diodorus Siculus*, Biblioth. Hist., xiv., 70, p. 697, ed. *Wessel.*—*Lucretius*, De Rerum Naturâ, lib. vi., ver. 1068–1100, 1123–1128, 1164 et 1233.—*P. Virgilius Maro*, Eclog., i., 51; et Georg., iii., 479 et 561–566.—*Livius*, L. iii., 6; l. iv., 30; l. vii., 38; l. xxv., 26; l. xxxvi., 23; l. xli., 21.—*Columella*, L. v., 5, p. 253; l. vii., 5, p. 300–303; l. viii., 5, p. 334, ed. Bip.—*Plutarchus*, De Dign. Adult., p. 195, ed. *Reiske*; De Sera Numinis Vindict., p. 558, ed. Francof.; Sympos., ix., 6, p. 731.—*Seneca*, De Ira., iii., 5 et 8, p. 588 et 590, ed. *Morelli*, fol., et Oed., ver. 77–80.—*Aretæus Cappadox*, De Caus. et Sign. Morb. Acut., i., c. 7, p. 5; et de Curat. Morb. Diut., ii., 13, p. 134, ed. *Boerhaave*.—*Appianus*, De Rebus Ill., cap. iv., p. 833 et 834, ed. *Schweighæuser*.—*C. Plinius Secundus*, Hist. Nat., xxvi., c. 1, 3.—*Juvenalis*, Satyr., iii., ver. 78–82.—*Q. Curtius Rufus*, Lib. ix., cap. 10.—*Galenus*, De Febr. Diff., I., 3, tom. vii., p. 108, ed. Chart.; De Puls. Diff., IV., 1, t. viii., p. 81; De Tumor., 13, t. vii., p. 320; De Ther., t. xiii., p. 960; De Loc. Aff., vi., p. 520, t. vii.; et Comment. in Hipp., III., Epid. I., t. ix., p. 263.—*Dio Cassius*, L. lxxii., 18, p. 1215, B., ed. *Reimar*, vol. ii.—*Eusebius*, Histor. Eccles., l. vii., cap. 17, p. 198, B., ed. Colon. Allobr., 1612, fol.—*Ammianus Marcellinus*, L. xiv., 6, p. 16, ed. *Ernesti*.—*Vegetius Renatus*, L. i., 14, p. 242, ed. Bip., l. iii., 2, p. 345, 22, p. 375, et 71, p. 415.—*Gregorius Nyssenus*, De Pauper. Amand. Orat., ii., p. 883, ed. Paris, fol.—*Cælius Aurelianus*, Morb. Chronic, l. iv., c. i., p. 497, ed. Amman. Amstel., 1709, 4to; et l. v., 2, p. 558; item Morb. Acut., i., introd., p. 5; et iii., 9, p. 219.—*C. Aëtius*, Tetrabibl., l. ii., p. 829; l. iii., 162, p. 62, 41; l. v., 94, p. 90, 30; et l. vi., 33, p. 106, 54, ed. Ald., fol.—*Evagrius*, Hist. Eccles., iv., 29, p. 404, C., ed. Vales., fol.—*Procopius*, De Bello Pers., ii., 23, p. 321, ed. Venet. Script. Byz.—*Justinian*, i., 8, C., de Testamentis (6, 23).—*Isidorus Hispalensis*, Etymol., l. iv., cap. 7, ed. Arevali., t. iii.; "Clades, quam inguinarium vocant," occurrit in Gregor. Pap. Vita, p. 253, a. Venet., t. xv., 4to; et de Natura Rerum, cap. 39, t. vii.—*Paulus Ægineta*, Βιβλια ἑπτα, lib. iv., 1, p. 131, ed. Basil., 1538, fol.—*Rhazes*, Opuscula. Basil., 1544, fol.; de Re Med., l. iv., cap. 24, p. 105; et de V. et M., ed. *Channing*. Lond., 1761, 8vo, p. 21, 29, 53.—*Avicenna*, Can. Med., libr. i., fen. 2, doctr. 2, p. 95, vol. i., ed. Venet., 1595, fol.; lib. iii., fen. 16, tract. 3, cap. 6, 67, p. 835, vol. i.; lib. iv., fen. i., tr. 2, cap. i., p. 18, 30 b., vol. ii.; tr. 4, cap. 1, p. 67; fen. iii., tr. i., cap. 17, p. 105, 116.—*G. Cedrenus*, Histor. Compend. Script. Byz., ed. Venet., vii., p. 204. B.—*Nicephorus Constantinopolitanus*, Histor., p. 32, B., Script. Byz., ed. Venet., vol. vii.—*Abimeron Abyzoahar*, Averrois Collig. et Ab. Ab. Venet., 1553, fol.; ii., 12, p. 175, B; et iii., 1, p. 188, lin. 55.—*B. Gordon*, Opus Lilium Medicinæ Inscript., &c. Lugdun., 1491, part i., cap. 10, p. 41.—*Arnold de Villanova*, Breviar. Pract. Med. a Capite usque ad Plant. Ped., &c. Mediol., 1483, lib. iv., cap. 32, p. 237.—*Valesco de Tarenta*, Philon. Pharmaceut. et Chirurg. de Medendis omnibus tum Internis, tum Externis Humani Corporis Effectibus, &c. Francof. et Lips., 1680, lib. vii., cap. 16, p. 788 (*Vitetur consortium et tactus infectorum: sin minus avertatur facies, si olfactetur acetum.*)—*Jacopo da Forli*, Medici Singularis Expositio et Quæstiones in Primum Canonem Avicennæ, &c. Venet., 1547; in i. cann., fen. 2, doctr. 1, cap. 8, p. 88.—*A. de Gradi*, Tractatus Insignis de Febribus, Signa, Causas, et Curationes Febrium complectens, cap. 25, p. 416.—*A. Benedict*, Op. omn. Basil, 1549. Libell. de Pestilent., cap. 3, p. 556; cap. 6, p. 558; cap. 10, p. 564.—*C. Clementinus*, Novum ac Peritile Opusc. de Pestilentia, et

de Curat. ejusdem perutrumque Reg. Preservativum ac Curativum. Taurini, 1507.—*N. Massa*, De Febr. Pestilent. ac de Pestichiis, Variolis, Morbillis, &c. Venet., 1555, tract. 2, cap. 1, p. 23, &c.—*H. Fracastorius*, De Contag. et Contagiosis Morbis, 4to. Venet., 1546.—*C. Peucerus*, Themata Med. de Morbis Contag., 4to. Titeb., 1574.—*T. Erastus*, Epist. de Contagio, 4to. Tiguri., 1574.—*J. Palmarius*, De Morbis Contagios., Libri VII. Hag. Comit., 8vo, 1578.—*J. Dacier*, Absque Preparatione pullum Contagium? Affirm. Theses. Parisiis, fol., 1579.—*F. Tdicæus*, De Natura Contagii. Bas., 4to, 1583.—*A. Chiocco*, De Contagii Natura, Carmen. Verona, 4to, 1597.—*J. Bamford*, A short Dialogue concerning the Plague's Infection. Lond., 8vo, 1600.—*Voitius*, De Contagionis Essentia, speciatim de Peste. Basil., 1604.—*S. Pietre*, An ex Contagio Sanitas? Paris, fol., 1607.—*H. Perlin*, Decamationes adversus Morborum Contagionem hujusque Autores et Fautores. Hanau., 4to, 1613.—*B. Baldi*, Prælectio de Contagione Pestifera. Romæ, 4to, 1631.—*F. Rondinelli*, Relazione del Contagio in Firenze l'Anno 1630–1633. Firenz., 4to, 1634.—*Brendel*, De Contagio et Contagione Pestilentiali. Jenæ, 1637.—*J. de Diemerbroeck*, De Peste (Libri Quatuor). Arnheim, 4to, 1646; Opera. Omnia, &c., fol. Ultraj., 1685.—*M. Sebiz*, De Morbis Contag. et Contagio. Argent., 4to, 1650.—*G. Lothus*, De Contagio. Regiomonti, 4to, 1650.—*A. Cnoffelius*, De Contagio in Genere. Bremæ, 1658.—*N. Hodges*, Λοιμολογια, sive Pestis nuperæ apud Populum Londini grassantis Narratio. Lond., 8vo, 1672; transl., Lond., 1720.—*Koerber*, De Contagiis Malignis. Erford., 1682.—*J. G. Dimelius*, De Morbis Contag. Lugd. Bat., 4to, 1685.—*G. W. Wedel*, De Contagio et Cont. Morbis. Jenæ, 4to, 1689.—*E. Camerarius*, Kurze Anmerkungen von Ansteckenden Krankheiten. Tübingen, 8vo, 1712.—*J. C. Hoffmann*, De Contagiis. Vitemb., 4to, 1712.—*Gibson*, Causes of the Discontents in relation to Plague, and the Provisions against it fairly stated and considered, 4to. Lond., 1721.—*D. Gagliardus*, Consigli per il Tempo di Contagio. Romæ, 8vo, 1720.—*R. Mead*, A short Discourse concerning Pestilential Contagion. Lond., 8vo, 1720; Works, &c., 4to. Lond., 1762, p. 213.—*C. Wintringham*, An Essay on Contagious Diseases. York, 8vo, 1721.—*J. Astruc*, De la Contagion de la Peste. Par., 8vo, 1724.—*J. C. Mender*, De Contagiis Idea nova et succincta. Servestæ, 8vo, 1725.—*J. C. Lischwiz*, Damnum ex Præjud. de Contagio ac Malignitate minus caute Divulgatis. Kil., 1733.—*Anon.*, Traité de la Communicat. des Maladies et des Passions. La Haye, 8vo, 1738.—*J. Fuerstenau*, De Contagio et Morbis Cont. Rinteliæ, 4to, 1742.—*R. Manningham*, The Plague a Contagious Disease. Lond., 8vo, 1744.—*T. Lobb*, Letters concerning the Plague and other Contagious Distempers. Lond., 8vo, 1745.—*B. Moreali*, Delle Febbri Maligne e Contagiose Nuova Sistema Teoricopratica. Venefia, 8vo, 1746.—*D. Ingram*, An Historical Account of the Plagues that have appeared in the World since 1346. Lond., 8vo, 1755.—*J. Junker*, De Vano ac Vero Morborum Contagii Metu. Halæ, 4to, 1757.—*R. Davis*, An Essay concerning Pestilential Contagion. Lond., 8vo, 1757.—*M. A. Plenciz*, in Opp. Medico-phys. Vindob., 1762, vol. i.—*A. E. Buechner*, De Natura Morborum Cont. generatim Spectata. Halæ, 4to, 1768.—*L. F. F. Crell*, In Contagium Vivum lustrans. Helmst., 4to, 1768.—*N. G. Clerc*, De la Contagion, de sa Nature, &c. Petersburg, 8vo, 1771.—*J. Sims*, Observations on Epidemic Disorders, &c. Lond., 8vo, 1773.—*W. J. Ulfers*, De Miasmate Contagioso. Kiliæ, 4to, 1773.—*J. C. Gerike*, Miasmatologiam Generalem sistens. Gottingæ, 4to, 1775.—*H. Nudov*, Animadversiones de Contagio. Lips., 4to, 1776.—*F. L. Bang*, in Soc. Med. Havn. Collect., vol. i., p. 100, 132, 157.—*Lasonne*, in Hist. et Mém. de la Soc. de Méd. de Paris, 1776, p. 97.—*A. P. de Escovar*, Avisos Medicos. Historia de todos los Contagios, &c. Mad., 4to, 1776.—*Boehm*, De Contagio. Viennæ, 1777.—*J. A. Unzer*, Ueber die Ansteckung, Besonders der Pocken. Leipz., 1778; Einleitung zur Allgemeinen Pathologie der Ansteckenden Krankheiten. Leips., 8vo, 1782.—*J. G. Gebler*, Migrationes Celebriorum Morborum Contagiosorum. Gotting., 4to, 1780.—*S. Farr*, The History of Epidemics, by *Hippocrates*, translated, with a Preliminary Dissertation on Infection. Lond., 4to, 1780.—*J. J. Menuret*, Sur l'Action de l'Air dans les Maladies Contagieuses. Paris, 8vo, 1781.—*M. Rosa*, De Epidemicis et Contagiosis Acroasis. Neapol., 8vo, 1782.—*P. J. Ferro*, Von der Ansteckung der Epidemischen Krankheiten. Leips., 8vo, 1782.—*O. Ryan*, Sur les Fièvres Infectieuses et Contag. Lyon., 8vo, 1785.—*T. Day*, Some Considerations on Infectious Air, and the Contagion of Maidstone Gaol. Maidstone, 8vo, 1785.—*E. G. Bose*, De Contagii Natura Animadversiones. Lips., 4to, 1786.—*J. F. C. Pichler*, Mémoire sur les Maladies Cont. Strasb., 8vo, 1786.—*F. Mezler*, Ueber die Wassersucht, nebst einem, Anhang über die Ansteckung. Ulm, 8vo, 1787.—*J. Alderson*, An Essay on the Nature and Origin of the Contagion of Fevers. Hull, 8vo, 1788.—*S. C. Titius*, De variis Contagiorum Modis. Lips., 4to, 1789.—*A. J. Cunitz*, Problemata quædam de Contagio. Jenæ, 4to, 1790.—*C. Reil*, Quædam circa Pathologiam Morborum Cont. Generalem. Halæ, 8vo, 1790.—*Barfoth*, in Contagium Epidemicum Inquirens. Ludæ, 1791.—*J. Ferriar*, On the Origin of Contagions and New Diseases, in Medical Histories, &c., vol. i., p. 261.—*Mueller*, De Ortu Morborum Cont. ex Fermento et Acrimonia Specifica deducto. Jenæ, 1793.—*P. F. Hopfengartner*, Beyträge, zur Allgemeinen und Besondern Theorie der Epidemischen Krankheiten. Leips., 8vo, 1795.—*S. L. Mitchill*, Remarks on the Gaseous Oxyde of Azote, the Nature of Contagion, &c. New-York, 8vo, 1795.—*J. Adams*, Observations on Morbid Poisons, Phagedæna, and Cancer. Lond., 8vo, 1795.—*W. Bay*, On the Operation of Pestilential Fluids on the large Intestines. New-York, 8vo, 1797.—*A. C. Lent*, Dissertation, showing how Pestilential Vapours become Acid and may be neutralized. New-York, 8vo, 1798.—*J. Franks*, On the Non-existence of Typhus Contagion, with Remarks on Animal Life, and Epidemics at Sea. Lond., 8vo, 1799.—*E. B. Poleman*, Cogitata quædam de Contagiis. Jenæ, 4to, 1800.—*C. Maclean*, The Plague not Contagious, or a Dissertation on the Source of Epidemic and Pestilential Diseases. Lond., 8vo, 1800.—*Rasori*, Riflessioni sulla Epidemia della Liguria, ossia Seggio di una Nuova Teoria sulle Malettie Epidemiche e Contagiose, &c. Genova, 4to, 1801.—*J. Bressy*, Théorie de la Contagion, &c. Par., 12mo, 1802.—*G. Wedekind*, Abhandlung von den Kuhpocken, mit einer Einleitung in die Lehre von den Ansteckenden Krankheiten, 1802.—*B. Laubender*, Miasmatologie, oder Naturgeschichtliche Darstellung aller Ansteckenden Krankheiten. Leips., 8vo, 1802.—*W. Blackburne*, Facts and Observ. on Scarlet Fever, with Remarks on the Origin of Acute Contag. Lond., 1803.—*J. C. Flachsland*, Fragmente über einige Ansteckungsstoffe, &c. Karlsr., 8vo, 1804.—*J. Dömling*, in *Dömling's* und *Horsch's* Archiv. für die Theorie der Heilkunde, bd. i.—*Bach*, Spec. de Morbis Contagiosis. Halæ, 8vo, 1804.—*A. G. Beyer*, Quædam Momenta de Contagio. Gotting., 4to, 1805.—*T. Alder*, A Recapitulation, &c., to show the Impropriety of considering Fever as arising from Contagion. Lond., 4to, 1805.—*G. Grassini*, Della Natura delle Febbri, &c., tom. i., cap. 6. Milan, 1805.—*W. Harty*, Observations on Dysentery, containing an Investigation into the Source of Contagion, &c. Lond., 8vo, 1805.—*G. Jouard*, Essai sur une nouvelle Théorie de la Contagion, &c. Par., 8vo, 1805.—*P. Rubini*, Riflessioni sulle Febbri Gialle e sui Contagi in Genere, &c. Parma, 8vo, 1805.—*Rossi*, in Mém. de Turin, ix., Sc. Phys. et Math. Hist., p. 92.—*L. Casinelli*, in Mem. della Soc. Med. di Bologna, i., p. 15.—*J. Sims*, Sketch of a new Theory of Cowpox, with Remarks on Contagious Disorders. Lond., 8vo, 1805.—*B. Ottendorff*, Momenta quædam Generalia de Morbis sic dictis Contagiosis. Mannhemii, 4to, 1806.—*Le Fort*, Sur les Maladies Contagieux. Paris, 4to, 1806.—*J. Barzelotti*, Polizia di Sanita per evitare e Contagi, &c. Sienna, 8vo, 1806.—*C. G. Ortel*, Tabellarische Allgemeine Anweisung zur Verhütung Ansteckenden Krankheiten, &c. Naumb., 8vo, 1806.—*F. Thalozan*, De Contagiis in Universum. Taurini, 4to, 1808.—*Guani*, Saggio Teorico e Pratico sulle Malat. Contag. ossia Riflessiona sull' Azione de Contagi e de Miasme in Generale. Genova, 8vo, 1808.—*F. Reuss*, in Comment. Soc. Phys. Med. Mosquensis, i., 2, p. 131.—*C. C. Balme*, De Ætiologia Generali Contagii, pluribus Morbis proprii. Lugd., 8vo, 1809.—*F. C. Bach*, Grundzüge zu einer Pathologie der Ansteckenden Krankheiten, &c. Halle, 8vo, 1810.—*F. Schnurrer*, Materialen zu einer Allgemeinen Naturlehreder Epidemien und Contagien. Tub., 8vo, 1810; transl. Par., 8vo, 1815; also, Chronik der Seuchen, &c., 2 vols. Tub., 8vo, 1823.—*J. Breton*, Sur la Contagion. Paris, 4to, 1810.—*G. Blane*, in Transact. of Soc. for Improv. of Med. Knowledge, &c., iii., p. 425.—*E. Bartels*, Pathologische Untersuchungen, &c. Marburg., 8vo, 1811.—*E. N. Bancroft*, An Essay on the Yellow Fever, with Observations concerning Contagion, &c. Lond., 8vo, 1811; also, Sequel to the above. Lond., 8vo, 1817.—*M. L. Este*, Cursory Remarks on Contagious Diseases, &c. Lond., 8vo, 1812.—*Nacquart*, in Dict. des Sc. Méd., tom. vi., art. Contagion, p. 46, 1813.—*G. F. Brodhag*, Meletemata de Vita Contagiorum. Lips., 4to, 1813.—*C. G. Bernhardus*, Meletemata quædam de Natura Contagiorum. Lips., 4to, 1814.—*D. Hosack*, in Amer. Med. and Philos. Register. New-York, vol. ii., p. 14, 1814.—*Kausch*, in *Hufeland's* Journ. der Pr. A., 1814; No. 9, t. xxxii., p. 1.—*C. Maclean*, Evils of Quarantine, and Non-existence of Pestilential Contagion. Lond., 8vo, 1814; Results of an Investigation respecting Epidemic and Pestilential Diseases. Lond., 8vo, 1817.—*J. J. Bernhardi*, Handbuch der Allgemeinen und Besondern Contagienlehre. Erfurt, 8vo, 1815.—*A. Moll*, Proeve eener Theorie vau de Werking der Contagia Acuta. Nymwegen, 8vo, 1815.—*J. W. Francis*, Letter on Febrile Contagion. N. Y., 8vo, 1816.—*G. Tommassini*, Delle Febbri Contagiose e delle Epidemiche Constituzioni. Bolog., 1817.—*J. A. F. Oxanam*, Histoire Médicale des Maladies Epidémiques, Contagieuses, et Epizootiques, &c., 5 vols. Par., 8vo, 1817.—*Haffner*, De Contagio. Berolini, 8vo, 1817.—*F. Rossi*, in Memorie della Reale Acad. delle Scienze di Torino, tom. xxiii., 1818.—*Potter*, in Amer. Med. Recorder, vol. i., p. 516. Philadelph., 1818.—*W. Stokes*, Observations on Contagion. Dublin, 8vo, 1818.—*A. Bodei*, Nuove Ricerche sull' Influenza Contagiosa Epidemica. Milan, 8vo, 1818.—*T. Bateman*, A Succinct Account of the Contagious Fever, with Observations on Contagion. Lond.,

8vo, 1818.—*Anon.*, Observat. on Contagion as it relates to the Plague and other Diseases. Lond., 8vo, 1819.—*V. L. Brera*, Lezioni Medico-pratiche sui Contagi e sulla Cura dei loro Effeti, &c., 2 vols. Padov., 8vo, 1819.—*A. B. Granville*, A Letter on Plague and Contagion in reference to Quarantine. Lond., 1819. — *R. Jackson*, An Analytical Sketch of the History and Cure of Contagious Fever. Lond., 1819. — *F. L. Amelung*, De Contagiorum Natura. Berolini, 8vo, 1819.—*C. F. Speyer*, Quatenus Organismus h. in Morbis, præsertim Contagiosis, a Natura Externa pendeat. Marburg, 1820.—*H. A. Godes*, Isis von Oken, 1820, 7, p. 429.—*L. Grossi*, Sulle Malattie Contagiose, e particolarmente sulla Peste. Genova, 8vo, 1820.—*F. Puccionotti*, Dei Contagi Spontanei, &c. Rom., 4to, 1820.—*J. Sedillot*, Notice sur la Fièvre Jaune, &c., considerée comme Non-contagieuse. Par., 8vo, 1820; et Discours sur la Valeur des Documens de *M. Chervin* sur la Fièvre Jaune. Par., 8vo, 1827.—*T. Hancock*, Researches into the Laws, &c., of Pestilence. Lond., 8vo. 1821.—*J. Th. Richter*, De Contagii eorumque Corpus Humanum inficiendi Ratione et Via in Genere. Lips., 4to, 1822.—*C. Balme*, Observations, &c., sur les Causes, &c., de la Contagion. Par., 8vo, 1822. — *K. H. Dzondi*, Ueber Contagien, Miasmen, und Gifte. Leips., 8vo, 1822. — *F. E. Foderé*, Leçons sur les Epidémies et l'Hygiène, 4 vols. Par., 8vo, 1822. — *W. Macmichael*, A New View of the Infection of Scarlet Fever, &c. Lond., 8vo, 1822; and a Brief Sketch of the Progress of Opinion upon the Subject of Contagion. Lond., 8vo, 1825.—*Marc*, Dict. de Méd., t. v., p. 538. Par., 1822.—*B. G. Sage*, Probabilités Physiques sur les Causes des Contagions Pestilentielles. Par., 8vo, 1822.—*Remer*, in Archiv. Gén. de Méd., tom. iii., p. 126, 1823.—*Lassis* et *alii*, in Révue Méd., tom. iv., p. 156 and 337, 1825.—*Omodei* et *Marx*, in Edin. Med. and Surg. Journ., vol. xxiv., p. 99. — *K. F. H. Marx*, Origines Contagii. Carol., 8vo, 1824; et Additamenta ad Origines Contagii. Carol., 8vo, 1826.—*Winterbottom*, in Ibid., vol. xxx., p. 62 and 321; and vol. xxxi., p. 92.—*Klose*, Encyclop. Wörterb., b. ii. Berl., 1828.—*Gasparin*, in Journ. Univers. des Sc. Méd., tom. xxxiv., p. 288.—*Bouillaud*, Dict. de Méd. Prat., t. v. Par., 1830. — *Brown*, Cyc. of Pract. Med., vols. i., ii. Lond., 1833.—*A. T. Thomson*, in Lancet, Feb. 14. 1835, p. 703.—*Nash*, in Med. Gaz., Dec. 30, 1837, p. 533.—*Magendie*, in Med. Chirurg. Rev., April, 1838, p. 522.

ii. PROPHYLACTIC MEASURES.—*Leviticus*, Ch. xiii., xiv., xv.—*Numbers*, Ch. v., xii., xix.—2 *Kings*, Ch. xv., ver. 5. —*Giovanni Salio*, De Præservatione a Pestilentiâ et ipsius Curâ, Opusc. non minus Utile quam Necessarium, &c. Viennæ, 1510, cap. 1, 2, 3.—Ordnung eines erbaren Raths zu Amberg wes sich Jederzeit in Sterbsleuften die Iren halten sollen. Amberg, 4to, 1562.—*M. Martini*, Wie Man sich vor aller Infektion Verwahren soll. Eisleben., 4to, 1598. — *Brunner*, Bericht, wie Man sich in Vorfallenden Sterbenszeiten verhalten soll. Leipzig, 4to, 1581.—*J. Ewich*, De Officio fidelis et prudentis Magistratus Tempore Pestilentiæ, &c. Neap., 8vo, 1582, translated by *J. Stockwood*. London, 8vo, 1583.—*C. Kegler*, Bericht wie Man sich in der Zeit der Pestilenz zu Verhalten hat. Cöln., 8vo, 1597.—*Anon.*, Orders made by her Maiestie and her Privie Councel for the Stay and further Increase of the Plague. Lond., 4to, 1592.—*M. A. Alaymo*, Discorso Int. alla Preservazione del Morbo Contag. e Mortale in Palermo, &c. Par., 4to, 1625.—*H. Freytag*, Unterricht und Bedenken, wie Man vor denen jetziger Zeit Jahrs Gemeinlich grassirenden Contagions Krankheiten sich Præserviren könne. Halberstadt, 8vo, 1636.—*M. L. Monnier*, Cabinet Secret des grands Preservatifs contre les Maladies Contagieuses, 8vo. Paris, 1666. —*M. Hoffmann*, Sciagraphia Morb. Contag. ex Natura Sanguinis præcavendorum et curandorum. Altdorfii, 8vo, 1668. —*W. Dobrzensky*, De Negroponte, de Saliva contra omnem in Aëre Serpentem Contagionem Præservativo Naturali optimo. Pragæ, 8vo, 1679.—Ordnung der Stadt Leipzig, wie es bei Besorgenden Ansteckenden Seuchen zu Halten. Leipzig, 1680.—*D. Bottoni*, Preserve Salutari contro il Contagioso Malare. Messina, 4to, 1691.—*Adam a Lebenwaldt*, Land-Stadtund Haus Arzneibuch zum Widerstand gegen Pestilenzialische Krankheiten. Nürnberg, fol., 1698.—*G. Budæus*, Consilium Medicum, wie Man nicht allein Wegen der Höchst Schädlichen Seuche der Pestilenz, sondern auch der bösen Fleckfieber, und anderer hitziger Krankheiten, &c., sich Verhalten, Bewahren und Kuriren könne. Burdissin, 4to, 1710.—*G. E. Stahl*, De Erroribus Practicis circa Contagiosarum Malignarum Febrium Curationem evitandis. Halæ, 1713. — *J. V. Muralt*, Aretæi Neu Eröffneter Balsamischer Gesundheits-Schatz, wider die Ansteckenden Seuchen. Zürich, 1714.—*J. Scheer*, De dubio Effectu Medicamentorum in Febribus Malignis Contagiosis. Duisb., 1724. —*A. E. Buechner*, De Provido Emeticorum Usu in Morbis Acutis Contagiosis. Halæ, 4to, 1756.—*J. Juncker*, De Mediis Contagii Epidemici, ortum Communicationem et Actionem in Corpus prohibentibus. Halæ, 1758. — *Ludwig*, Progr. Fines Officii Medentium in Morbis Contagio Nocentibus. Lips., 1758. —*J. Lind*, On the most effectual Means of preserving the Health of Seamen; on Fevers and Infection, &c. Lond., 12mo, 1757; also, Two Papers on Fever and Infection. Lond., 8vo, 1763.—*A. P. Nalmys*, De Qualitate noxia Aëris in Nosocomiis et Carceribus, ejusque Remediis. Harl., 8vo, 1770. — *W. Brad[illegible]*, Considerations on the Means of preventing the Communication of Contagion, &c. Lond., 4to, 1771.—*S. A. Tissot*, Anweisung, wie Man sich bei Grassirenden und Ansteckenden Krankheiten zu Verhalten. Leipzig, 8vo, 1772.—*J. F. Zuckert*, Von den wahren Mittelu, die Entvölkerung eines Landes in Epidemischen Zeiten zu Verhüten. Berlin, 8vo, 1773. — *C. A. Kortum*, Anweisung, wie Man sich vor allen Ansteckenden Krankheiten Verwahren könne. Leipzig, 8vo, 1779.—*F. L. Bang*, in Soc. Med. Havn. Coll., i., p. 179. — *Carrère*, in Hist. et Mém. de la Soc. de Méd. de Paris, 1780 et 1781, Mém., p. 215.—*Godart*, in Nouv. Mém. de Dijon, 1785, ii., p. 346.— *T. Day*, On the different Ways of removing Confined and Infectious Air. Lond., 8vo, 1784. — *W. W. Schrötteringk*, Gedanken über Quarantaineanstalten überhaupt und insbes. über die Hamburgischen. Hamb., 8vo, 1789.—*G. H. Clarke*, Upon the Means of preserving the Health of the Poor, and preventing and suppressing Epidemical Fevers. Lond., 8vo, 1790.—*J. G. Smyth*, Account of the Experiment made to determine the Effect of the Nitrous Acid in destroying Contagion. Lond., 8vo, 1796. — *S. L. Mitchill*, On Quarantines and Lazarettos N. Y. Med. Repos., v., No. 2, App.; and on the Nature of Septic Gas, &c. N. Y. Med. Repos., 1799, ii., No. 1.—Proceedings of the College of Physicians of Philadelphia, relative to the Prevention of the Introduction and Spreading of Contagious Diseases. Philad., 1798.—*A. P. de Escovar*, Historiâ de todos los Contagios, su Preservasion y Medios de limpiar las Casas y Muebles Suspechosas. Madrit, 8vo, 1800.—*Wegscheider*, in Schriften der Hamb. Gesellsch., b. vii., 1800.—*J. Haygarth*, A Sketch of a Plan to exterminate Smallpox from Great Britain. Lond., 8vo, 1793; also, Letter to *Dr. Percival*, On the Prevention of Infectious Fevers, &c. Bath, 8vo, 1801.—*H. Davy*, Chemical and Philos. Researches concerning Nitrous Oxyde, &c. Lond., 8vo, 1800.—*L. B. Guyton Morveau*, Traité des Moyens de désinfecter l'Air, de prevenir les Contagions, et d'en arrêter les Progrès. Paris, an. 9, 8, 2d ed., 1802, transl. by *R. Hall*. Lond., 8vo, 1802. — *C. Stanger*, Remarks on the Necessity and Means of suppressing Contagious Fevers. Lond., 18mo, 1802.—*Heinrichmeyer*, De Artificiali Contagiorum Insitione. Erlang., 1802.—*J. Johnstone*, Account of the Discovery of the Power of Mineral Acid Vapours to destroy Contagion. London, 8vo, 1803; and Reply to *Dr. J. C. Smyth*, and a farther Account of the Discovery, &c. Lond., 8vo, 1805. — *Kevaudrens*, in *Hufeland's* Journ. der Pr. Arzn., 1805, N. I., 14 bd., p. 129. — *R. Pearson*, Outlines of a Plan to put a Stop to the Progress of the Malignant Contagion, &c. Lond., 8vo, 1804. — *C. A. Fischer*, Ueber die Quarantaine-Anstalten in Marseille, 8vo. Leipzig, 1805. — *A. H. F. Gutfeld*, Einleitung in die Lehre von den Ansteckenden Krankheiten. Posen., 8vo, 1804.—*Gebel*, Bruchstücke über Ansteckende Krankheiten und das Gelbe Fieber. Berlin, 8vo, 1805. — *J. C. Smyth*, Letter to *W. Wilberforce*, on a Pamphlet by *J. Johnstone*. Lond., 8vo, 1805; and Remarks on a Report of *M. Chaptal*, with an Examination of the Claim of *Morveau*, &c. Lond., 8vo, 1805. — *Buniva*, in Mém. de Turin, 1805–8, t. ix.; Sc. Phys. et Math. Hist., p. xcv., m., p. 127.—*C. G. Oertel*, Tabellarische Allgemeine Anweisung zur Verhütung Ansteckender Epidem. Krankheiten, &c. Naumburg, fol., 1806.—*C. Mayr*, Specimen Practicum de Remediis efficacissimis in Morbis Contagiosis, &c. Vien., 8vo, 1806.—*J. Barzelotti*, Polizia di Sanità per evitare i Contagi. Siena, 8vo, 1806.—*J. Penada*, Ragionamento Medico-profilatico ai Medici, &c., 4to. Padova, 1806.—*J. C. Renard*, Die Mineralsauren Räucherungen als Schutzmittel gegen Ansteck. und Epid. Krankheiten. Mainz, 8vo, 1810.—*A. Caron*, Manuel de Santé et d'Economie Domestique, &c. Paris, 12mo, 1812. — *M. J. Gutberlet*, Versuch über die Sicherungsanstalten gegen die Entstehung und Ausbreitung Contagiöser Krankheiten im Felde, &c. Wurzburg, 8vo, 1811.—*F. S. Kosak*, De Fumigationibus Acidis in Morbis Contagiosis. Landishuti, 8vo, 1812.—*C. H. E. Bischoff*, Hulfsbuchlein für Jedermann zur Verhütung und Glücklichen Bekampfung Bösartiger, Ansteckender und Epidemischer Fieber. Frankfurt, 8vo, 1813. — *C. F. Graefe*, Die Kunst, sich vor Ansteckung bei Epidemieen zu Sichern. Berlin, 1813.—*Ebers*, Ueber Vorbauungs und Verhaltungsmassregeln bei Ansteckenden Fiebern. Breslau, 4to, 1814.—*K. v. Gimbernat*, Anleitung um der Ansteckung und Verbreitung der Fieber-Epidemieen durch Zweckmässigen Gebrauch der Bewährtesten Mittel Vorzubeugen. Karlsruhe, 8vo, 1814. — *E. Romershausen*, Luftreinigungs. Apparat zur Verhütung der Ansteckung in Lazarethen und Krankenhäusern. Halle, 8vo, 1815.—*J. F. Wittmann*, Erfahrun, über die Ursachen der Ansteckenden Krankheiten belagerter Festungen, &c. Mainz, 8vo, 1819. —*H. Ritter*, Abhandlung von den Ursachen Ansteckender Krankheiten, und den Physischen und Chemischen Mitteln. Leipzig, 8vo, 1819. — *C. Maclean*, Suggestions for the Prevention and Mitigation of Epidemic and Pestilential Diseases. London, 8vo, 1819.—*L. J. M. Robert*, Guide Sanitaire des Gouvernemens Européens, ou Nouv. Recherches sur la Fièvre Jaune, le Cholera Morbus, &c., 2 tomes, 8vo. Paris, 1826.—*T. Alcock*, On Chlorurets as Disinfect. Agents, 8vo. Lond., 1827.—*J. Copland*, Of Pestilential Cholera, its Nat., Prevention, and Curative Treat., 8vo. Lond., 1832, p. 96.

[AM. BIBLIOG. AND REFER.—New-York Medical Repository, conducted by Drs. *Mitchill, Miller, Smith*, &c., 1796, &c.—New-York Medical and Philosophical Journal, 3 vols.—American Medical and Philosophical Register, conducted by Drs. *Hosack* and *Francis*, 4 vols., 1810, &c.—New-York Medical and Physical Journal, conducted by Drs. *Francis, Beck, Dyckman*, &c., 7 vols.—Philadelphia Medical Museum, by *Cox*, 7 vols.—American Medical Recorder, by *Eberle, Ducachet*, and others, 14 vols.—North American Medical and Surgical Journal, 10 vols.—New-England Journal of Medicine and Surgery, 12 vols.—New-York Journal of Medicine and the Collateral Branches of Science.—*Adams*, Dissertation on Yellow Fever, 1791.—*Dyckman*, On the Pathology of the Human Fluids.—*Hardec*, On the Yellow Fever of 1795, 1798, 1805, 1822.—*Currie*, On the Yellow Fever of 1799.—*Chisholm*, Letter to *Heygarth*.—*Hosack*, Medical Essays, 3 vols.—Facts and Observations relative to the Nature and Origin of the Pestilential Fever of Philadelphia, in 1793, 1797, 1798; Additional Facts of the same, 1806.—Proceedings of the College of Physicians of Philadelphia, 1798.—*Mitchill*, The Case of the Manufacturers of Soap and Candles, 1797.—*Webster*, History of Pestilence, 2 vols., 8vo.—*Webster*, A Collection of Papers on the Subject of Bilious Fevers prevalent in the United States, 1796.—*Seaman*, An Account of the Epidemic Yellow Fever of 1795.—*Monson*, On the Yellow Fever of New-Haven.—*Francis*, in *Brewster's* Encyclopædia, Article MEDICINE.—*Miller*, Medical Writings, 8vo.—*Townsend*, On the Yellow Fever of New-York, in 1822.—*Rush*, Medical Observations and Inquiries, 4 vols.—Transactions of the Literary and Philosophical Society of New-York, 4to, 1815.—*Walters*, On the Yellow Fever of New-York, in 1822, in New-York Medical and Physical Journal, vol. ii.—*S. H. Dickson*, Essays on Pathology and Therapeutics, being the Substance of the Course of Lectures delivered by him in the Med. College of S. C., 2 vols., 8vo. Charleston, 1845. (*Dr. Dickson* maintains that contagion is the chief source of all epidemic diseases; that it always owes its origin to specific diseased action, which it is capable of reproducing under favourable circumstances. Some contagious diseases, however, he supposes may arise spontaneously, as typhus fever, pestis, peora, and dysentery, while others are altogether dependant on the presence of contagious matter, as the vaccine.)]

INFLAMMATION.—SYN. Φλόγωσις (from φλοξ, a flame), φλεγμονὴ (from φλέγω, I burn), φλέγμα, φλέγμασια, Gr. *Inflammatio, Phlogosis, Phlegmone, Phlegmasia*, Lat. *Entzündung*, Germ. *Inflammation, Phlegmasie*, Fr. *Infiammazione*, Ital.

CLASSIF.—1. *Class*, Febrile Diseases; 2. *Order*, Inflammations (*Cullen*). 3. *Class*, Diseases of the Sanguineous Function; 2. *Order*, Inflammations (*Good*). III. CLASS, I. ORDER (*Author in Preface*).

1. DEFIN.—*Alteration of the vital actions of a part, manifested by morbid sensibility or pain, by redness, increased temperature, and swelling, generally with more or less febrile commotion of the system.*

2. *Inflammations* or *phlegmasiæ* constitute one of the most numerous classes of disease, and appear the most frequently in practice. They are the most common sources of structural lesions, while they are, in their developed states, themselves lesions of organization, yet originating in changes which are not at first, although they rapidly become more and more manifest. They are thus intermediate states between disordered vital action and change of structure, retaining, however, the characteristics of the former condition, even when they have superinduced the latter. They may be seated in any organ of the body, and in any tissue, excepting the cuticle, hair, and nails; but certain structures or parts are much more frequently affected by them than others. The phenomena characterizing inflammations; the changes in the circulating and secreted fluids attending them; the effects produced by them locally and constitutionally; the remarkable variations these effects present, with the state of the system, and with the exciting causes; and the almost universal liability of the tissues and organs to their invasion, combine to impart the utmost interest and importance to the investigation of their *nature* and *treatment*.

3. In treating of this subject, I shall describe, *first, the phenomena, local and general, constituting inflammation of a sthenic form*, or as observed in a previously healthy person, with *their course and terminations*, or consequences; *secondly, the varieties or states inflammation assumes*, owing to certain predisposing, exciting, and concurrent causes, to the previous condition of the patient, to morbid associations, and to the tissues affected; *thirdly, the causes and pathology, or rational theory of inflammation*; and, *fourthly, the treatment*, with reference to the different forms, states, and complications of the disease. Under one or other of these heads I hope appropriately to introduce everything of importance connected with the *causes, nature*, and *treatment* of this most important, most common, and but imperfectly understood deviation from the healthy state.

4. I. OF THE PHENOMENA CONSTITUTING STHENIC INFLAMMATION, AND OF THEIR COURSE AND TERMINATIONS.—It is necessary, in order to form a satisfactory view of inflammation, to consider, first, its phenomena, as manifested in a previously healthy constitution. It then presents characters which have been variously denominated, in order to distinguish them from those which attend inflammation occurring in previously disordered frames, as the *adhesive, phlegmonous, healthy, reparative, sthenic*, &c. I have preferred the last of these terms, as it is more appropriate to most of the states in which this species of the disease presents itself. As *sthenic inflammation* occurs both in acute or active, and in slighter or more chronic forms, I shall describe it accordingly, but with due reference to the succession of one to the other, to the usual procession of the morbid phenomena of each, to the effects upon the circulation and secretions, and to the ultimate results.

5. i. OF ACUTE STHENIC INFLAMMATION.—*A. Local Characters.*—In this, which may be denominated the truest, or the most unequivocal form of inflammation, there is an *increase of the vital actions*; but this increase must be of a certain duration, and the vital actions must be altered in character as well as in degree, must be truly *morbid*, as I have contended in the article DISEASE (§ 87, *et seq.*), to constitute inflammation, and to distinguish it from the vital turgescence, which is temporarily produced by local stimuli, or even by mental excitement. The true seat of inflammation is always the ganglionic nervous system and the capillary vessels of the part affected; the primary change, as will hereafter be more fully shown, originating with the former, but more fully expressed in the latter constituent of the organization.*

6. *Acute sthenic inflammation* commences with increased or *altered sensibility or pain* of the part, to which soon succeeds *redness*, from increased vascularity, from the enlargement of

* I may here state, that this and other views connected with the pathology of inflammation were published by me, first, in 1815, and subsequently in 1820, 1822, and 1834, in the works referred to in the Bibliography. It is the more necessary to state this, as several of these views have been adopted by later writers, and brought forward with an air of originality to which they have no claim.

vessels. The *temperature* of the part is raised, the *functions* disturbed, the *secretions* at first interrupted, and subsequently changed; and swelling takes place. These phenomena are always present in a more or less remarkable manner, or in different proportions, and are much augmented when the system sympathizes and febrile action is developed. Neither of these constitutes inflammation when existing singly, and but four of them have generally been considered requisite to its existence, namely, *pain, redness, heat,* and *swelling. Disturbance,* however, *of the functions,* and *disorder of the secretions* of the part are constantly present, and are as much constituents of the disease as are those more generally conceded to it. To these, *the local symptoms,* it will be necessary more particularly to advert before the *constitutional disorder,* consequent upon the local affection, is considered.

7. *a. Uneasy sensation, from its lowest grade, until it amounts to acute pain,* is the primary symptom following the operation of the exciting cause, or characterizes that kind of excitement, or deranged influence of the ganglionic nerves forming the first series of the changes in the affected part, and it is heightened or kept up by the alteration thereby induced in the action of the capillaries. When the uneasy sensation amounts to pain, it is owing either to the degree of change in the organic nervous fibrillæ, or to the communication of the morbid excitement, originating in these nerves, to the terminations of the cerebro-spinal nerves, with which they are associated in the tissues. The pain, therefore, of inflammation originates in, or arises from a change in the state of the particular influence exerted by the organic nervous fibrillæ of the part; this change deranging the action of the capillaries supplied by these fibrillæ, and often exciting or otherwise disturbing the sensibility of the associated cerebro-spinal nerves. That the extension, however, of the morbid change to the latter nerves is merely contingent, is shown by the slightness of the pain, or by the absence of acute pain in many cases of severe inflammation of internal viscera, particularly those which are not supplied by these nerves; and that the morbid sensation originates in the organic or ganglial nerves, and not in the cerebro-spinal, is rendered probable by the circumstance of the most acute pains which are clearly referrible to the latter class of nerves, as those of neuralgia, trismus, and other spasmodic affections, not being attended by inflammation.

8. The *uneasy sensation* is the sensible manifestation of the primary change in the organic nerves of the part; of that change which induces the vital expansion or turgescence of the capillary vessels, and the consequent increased influx of blood. The morbid sensation is afterward increased to *actual pain* by the circumstances just stated (§ 7), and by the excessive expansion and tension taking place in that part. It differs in severity and character according to the degree of inflammation, and to the sensibility and structure of the affected part. It often consists of soreness or aching; of pricking, itching, tickling, tension, heat, or burning; of painful throbbing, tearing, darting, gnawing, &c.; and in parts abundantly supplied with nerves, particularly with the nerves of sensation, it is most acute. In mucous, cellular, and parenchymatous structures the pain is rarely very severe. The substance of the brain, or of the lungs, or of the liver, or of the kidneys is often acutely inflamed without sensibility being materially excited. Severe pain in these diseases is owing either to the extension of inflammation to the serous or fibrous structures, or to the tension of these tissues, caused by the swelling of the parts they enclose. Unyielding and dense textures, as the fibrous, serous, and fibro-cartilaginous, are generally the most painful when acutely inflamed. Pain does not always represent the true seat of the disease. In cases of partial inflammation of the substance of the brain, pain may be felt only in some remote part of a limb, or in a part of the scalp. During the inflammation of the substance either of the lungs, or of the liver, or of the kidneys, or of the uterus, pain may be felt only in those ramifications of the cerebro-spinal nerves which are most intimately related to the organic nerves of the affected part, as in the vicinity of the clavicle or shoulders, in the limbs, &c.

9. It is necessary to study, not only the severity and character of pain, with reference to the existence of inflammation, but also its types or modes. The uncasy sensation attending inflammation is generally constant; and, although often exasperated at times, it is never altogether absent. Even when no pain is complained of, as often occurs in inflammations of internal viscera, tenderness to the touch, or to pressure, is generally present. When, with continued pain, or with a sense of soreness, aching, or of throbbing synchronous with the pulse, or of heat, more or less constant, there are tenderness on pressure, and increase of the morbid sensation on exercising the functions of the part, inflammation may be inferred, even when other indications of it are absent. But the most severe pains, without tenderness, or with perfect tolerance of pressure, and especially if they are paroxysmal, and attended by complete intermissions, furnish no evidence of inflammation.

10. *b. Redness,* of itself, is not sufficient to indicate inflammation. It may arise from active congestion of the capillaries, or from a vital turgescence of only temporary duration On the application of an irritant, redness of the part is not manifested immediately, although uneasy sensation is induced; but it soon is developed, owing to the morbid excitement of the nervous fibrillæ, and, like this morbid state, it is more or less permanent. The redness which has thus arisen is caused by the vital expansion of the capillaries, and by the admission of a larger current of blood into them, and of the colouring globules into a series of vessels which did not formerly admit them. The blood, also, during the sthenic state of inflammation, becomes somewhat more florid than usual in the capillary vessels. The redness is generally greatest in the centre of the inflamed part, or in that spot in which the irritation originated; but it spreads more or less, and is gradually lost in the surrounding tissues. The colour varies in depth or hue with the progress and form of inflammation; but, in the species now being considered, it is more or less florid or deep. In very vascular, or highly organized

parts, the tint is deepest, owing to the more intense state of action.

11. Increased redness of a part may exist, as just stated, without inflammation. In order to impart to it essentially inflammatory characters, the vascular action, from which the redness proceeds, must not only be excited, but also otherwise changed from the healthy state. It must be rendered truly morbid. Stimuli or mental emotions will produce redness, but this redness is not inflammatory; it soon disappears, and gives rise to no consequences or lesions. The excitant or irritant must, from either its continued or its peculiar action, change or vitiate, as well as excite the organic nerves of the part; must impart to them a *truly morbid state* or influence, which similarly affects the vital actions of the capillaries, not merely exciting, but also modifying that action, so as to give rise to effects very different from those observed in health. In this respect, chiefly, the redness of inflammation differs from simple vascular excitement, or injection, or congestion. In this latter state the vessels are distended, and contain more than their usual quantity of blood, the circulation through them varying in activity, either rising above or sinking below the common grade of celerity. This state, to which only the very loose and often inappropriately employed term, *hyperæmia*, recently introduced into pathological discussions, is applicable, is, however, very different from true inflammation, although it may be readily converted into some one of the varieties of inflammation. It is unattended by that morbid state of the organic nerves of the part upon which the true inflammatory action of the capillaries depends. However denominated, whether *congestion* or *hyperæmia*, or however qualified by the prefix *active* or *passive*, it forms no essential part, and constitutes no particular stage of sthenic inflammation, as supposed by some recent writers.

12. If we trace *the course* of the vascular disturbance, we shall find that a contraction of the capillaries of the part follows upon the application of an irritant, and upon the change produced in the organic nerves of the part. The contraction is soon followed by a reaction or vital expansion of these vessels, an increased afflux of blood, and the other phenomena of the excited vital process. The veins receive the blood from the minutest ramifications of the capillaries, in such a manner as naturally to retard the capillary circulation in them. Consequently, when the action of the capillaries is morbidly increased, expansion of these vessels, and an excessive accumulation of blood in them, must necessarily follow; for the veins are incapable of receiving and carrying onward with sufficient rapidity the quantity of blood sent to them. Owing to this circumstance, vessels previously admitting only the colourless blood, become expanded, so as to admit the red globules; and as the morbid process goes on, new vessels are probably developed, the blood also becoming, and continuing to be more florid as long as the sthenic action persists.

13. *c. Increased heat*, as well as augmented redness, is the result of the morbidly excited action. Experiments, however, with the thermometer show that the warmth of inflamed parts is not so great as the sensations usually indicate. Some writers, as HUNTER, ABERNETHY, MAYO, and others, contend there is actually no increase of the temperature above the healthy standard, but such is not the case. The temperature of an inflamed part upon or near the surface is usually several degrees higher than that of parts at some distance from it; and even the deep-seated viscera experience a rise of two or three degrees, and often much more, above the healthy temperature of 98°. The existence of heat, even with increased redness, is not an unequivocal symptom of inflammation, for it may depend upon temporary or healthy excitement merely. It is necessary to be continued to indicate a morbid state of action. Moreover, it may be so slightly augmented as to escape notice.

14. As to *the source* of heat in inflamed parts, some difference of opinion has existed. Since CRAWFORD proposed the theory of the dependance of animal heat upon the different capacities of venous and arterial blood for caloric, the warmth of these parts has been imputed by many to the quantity of blood circulating through them, and passing from the arterial to the venous state. Without occupying my limits with the opinions and discussions as to animal heat, I may remark that Sir B. BRODIE considered, from his experiments, that the cerebro-spinal nervous system was instrumental in its production. This opinion, however, was not confirmed by the researches of LEGALLOIS, W. PHILIP, and HASTINGS. In 1820, 1822, and 1824 I published my views on the subject (see *Lond. Med. Repos.*, vol. xvii., p. 370, and *Appendix* to RICHERAND'S *Elements of Physiology*, p. 630), and contended that animal heat is not the result of the difference of capacity existing between venous and arterial blood; for, as Dr. DAVY has shown, this difference is not sufficient to explain the phenomenon, although it may be subordinately concerned in producing it. I then stated that the various causes which modify the production of animal heat act, 1st, immediately upon the organic system of nerves; 2dly, upon the blood; and, 3dly, through the medium of the cerebro-spinal system, modifying the influence which this system imparts to the ganglial. I then viewed animal heat more as a vital secretion than as a chemical phenomenon, as proceeding from, and as being controlled by, the influence exerted by the ganglial system of nerves upon the vascular system and blood; and the subsequent researches of CHOSSAT and EDWARDS obviously confirm this opinion. Conformably with this view, I have stated, in the works referred to, that the increased heat of inflammation is derived from the same source, from the influence of the organic nerves upon the vessels of the affected part, aided by the increased circulation through the capillaries; the nervous influence enlarging these vessels, or occasioning an erectile state of them, and thereby soliciting an afflux of blood to the part. The increased temperature of erectile tissues, consequent upon irritation of their nerves and expansion of their vessels, fully illustrates this theory of animal heat, and particularly with reference to inflammation.

15. *d. Swelling* has been assigned above as one of the changes constituting inflammation. But, from what I have already stated, it should be viewed rather as a consequence of this act

than as an essential part of it. Besides, swelling is not always present, owing to circumstances about to be noticed. The morbid state of the organic nerves and the expansion of the capillaries are the earliest causes of swelling. But, as the diseased action proceeds, a more or less copious exudation of serum into the areolar tissue takes place; a portion of the serum, and even of the red particles of the blood, passes through the pores or distended walls of the capillary canals, especially in cellular or mucous tissues, distending, tumefying, and thickening the inflamed part. Hence the areolæ of cellular structures are found filled with a serous, sero-albuminous, and often with a sanguineous fluid, in which flocculi are sometimes seen floating, or adhering to the parietes of the areolæ or cells, these parietes being often thickened.

16. The *nature* of the swelling entirely depends upon the state or kind of fluid thus exuded from the inflamed capillaries. The *state* of the fluid depends upon the kind of disorder of the organic nervous influence of the part, and of the constitution generally, and upon the degree of vital power exerted by the system. In the *sthenic species* of inflammation, this power, however much it may deviate from the healthy condition, is at least not depressed below this condition. The fluid exuded is therefore a product of increased or sthenic vascular action, excited and kept up by the influence exerted on the capillaries by the nerves in which the disorder originated. Hence it is generally sero-albuminous, or a mixture of serum and coagulating lymph, sometimes containing colouring particles when the morbid action is intense; and the consequent swelling is firm, tense, and limited as to extent. The sero-albuminous or coagulating character of the effused fluid entirely depends upon the sthenic nature of the inflammation, and is of the utmost importance as respects the subsequent changes. When the organic nervous or vital power, locally or generally, is depressed or otherwise vitiated, as well as depressed, the effused fluid is not albuminous, and does not coagulate. It is then either serous or sanguineous, or even sanious, and does not possess the characters of coagulable lymph. The consequent swelling is œdematous, soft, diffusive, or spreading, owing to the fluid state of the exudation, and its more ready infiltration into the surrounding parts. While organic nervous or vital power is unreduced, the exuded matter occasioning the swelling in the advanced stage of inflammation at least partially coagulates, and limits the extension of tumefaction. But when this power is much reduced, or greatly vitiated, as in the different forms of *asthenic* inflammation, this matter retains its fluidity, infiltrating and infecting the surrounding tissues.

17. The existence and amount of swelling chiefly depends upon the nature of the inflamed tissue. It is neither so early nor so obviously present in inflammation of dense structures as in that of soft and yielding parts. It is inconsiderable in fibrous, fibro-cartilaginous, and serous tissues, and is hardly apparent until the morbid action has continued for some time. In cellular, mucous, and parenchymatous tissues, the swelling is early and considerable. In certain parts, as in cellular tissue bound down by aponeurotic expansions, and in the internal structure of organs surrounded by fibrous or unyielding membranes, the swelling is less, or more slowly developed; the pressure thus occasioned restraining the effusion and the expansion of the capillaries. But, where the morbid action is intense, the pressure gives rise to a most distressing sense of tension, interrupts the functions of the organ, and sometimes even the circulation in it, thereby destroying its vitality and occasioning dissolution. When the substance of the brain is inflamed, the nature of its circulation, the great division and tenuity of its capillaries, and the unyielding nature of its surrounding structures combine to prevent it from becoming much swollen. Yet there is every reason to believe that more or less swelling actually occurs (see art. APOPLEXY, and BRAIN—*Inflammation of*), and that the pressure on the inflamed organ, occasioned by the unyielding parts surrounding it, gives rise to the more dangerous symptoms observed in the advanced progress of the disease.

18. *e.* The *functions* of an inflamed organ, tissue, or part, are, as Mr. MORGAN has very justly contended, more or less disordered; and I may add that the disorder is one of the earliest phenomena or constituents of the morbid action, being nearly coetaneous with the change in the organic nervous power, on which this action depends. The disturbance of the functions is generally in proportion to the violence of the disease. If the inflamed part performs a secreting function, the secretion is either diminished, increased, or altered in character. *Diminution* of this function is observed, when the cutaneous surface is inflamed, at the commencement of acute inflammation of serous and mucous membranes, and when the morbid action in glandular secreting organs is sudden or intense. When parts near the surface are inflamed, perspiration is obstructed, and the temperature is thereby increased. It is only at the commencement of inflammatory action in serous and mucous surfaces that their secretions are diminished: as the disease proceeds, their secretions become increased, but, at the same time, changed in their characters; the change varying with the intensity, form, and duration of morbid action, and with the state of the patient. Inflammation of glandular organs is generally attended by suspension or diminution of their secretions, as in hepatitis, nephritis, &c. But in many cases, one kidney only, or a portion of the liver, may be inflamed, the secretion being only diminished or somewhat altered. It should, however, be recollected that the secretions of an organ may be suspended, increased, or morbidly affected otherwise than by inflammatory action.

19. The lesion of function attending the commencement of inflammation obviously depends upon the primary affection of the organic nerves. That accompanying the advanced progress of the morbid action proceeds not only from this source, but also from the alteration in the capillary circulation, from the consequent effusion of lymph in the inflamed tissue, and from the swelling and mechanical obstruction thereby produced.

20. The *throbbing* is connected with the obstruction to the return of blood, particularly from the expanded capillaries into the veins.

It is synchronous with the pulse, and is caused by the injection of blood into the part on each contraction of the left ventricle of the heart. It increases and renders the pain pulsatile; when it occurs at an advanced stage of inflammation, it is usually soon followed by suppuration. It is increased by a depending position of the inflamed part, and by whatever either obstructs the return of blood from, or favours the flow of it to, the seat of disease.

21. *B.* Of the Local Appearances after Death.—Certain of the preceding local characters of inflammation necessarily disappear with the termination of life; and the rest, as redness and swelling, either vanish, or remain for some time afterward. *Redness* does not always continue after death; its absence, therefore, is no proof that inflammation had not existed during life. Its presence also, *post mortem*, is not sufficient evidence of its dependance upon this cause. At an early stage of inflammation, and before the capillaries have lost their vital tone or contractility, and before much serum or lymph has been effused, redness generally disappears after death. Even when much effusion of fluid, and other changes consequent upon the morbid vascular action, have taken place, the blood may have entirely forsaken the vessels before the parts have been examined. Where redness actually exists, much discrimination is necessary to determine whether or not it has proceeded from inflammation, or from a dependant position, or from transudation of the colouring matter of the blood from the vessels, or from incipient decomposition. It may arise from either of these. In many cases, two or more combine to produce it: a depending position favours both the gravitation of the fluids in the vessels, and the exudation of the colouring particles in the lower parts. The injection caused by position more readily occurs in parts which have been inflamed than in those previously sound. Much, however, depends upon the seat and form of inflammation, and upon the circumstances connected with dissolution. Next to position, obstructed circulation through the heart or lungs, or obstruction to the return of blood in the veins, most frequently occasions non-inflammatory injection and redness, particularly in mucous surfaces; but, in such instances, the redness is more or less general or diffused in these parts, or exists in situations remote from each other, and is not attended by the usual products of inflammation. Attention to the circumstances causing redness of parts after death will generally enable the practitioner to infer with accuracy its dependance upon inflammation. When it is associated with any of the usual products or consequences of this disease, as the effusion of lymph, or of a sero-albuminous fluid, with softening, swelling, &c., then no doubt as to its origin need be entertained. (See *Diagnosis*.)

22. *C.* Of the Constitutional Symptoms or Effects of Sthenic Inflammation.—The constitutional phenomena vary remarkably with the exciting causes, the intensity, and the seat of inflammation; and they are farther modified by age, habit of body, diathesis, and epidemic constitution. When inflammatory action takes place in a previously healthy person, and from causes which do not materially vitiate or depress the vital powers, or contaminate the circulating fluids, the constitutional effect presents certain features which are rarely wanting. It has been variously denominated as *Symptomatic Inflammatory Fever*, *Sympathetic Synocha*, *General vascular Reaction*, *Inflammatory Fever*, &c., and has been improperly described in connexion with, or, rather, as a species of true fever. Indeed, some writers, as I have shown in the article Fever (§ 91), particularly Clutterbuck, Marcus, and Broussais, have contended that the *constitutional affection*, produced by the local changes constituting inflammation, is in no respects different from *idiopathic fever*. In the article just referred to, I have stated sufficient to prove the very remarkable differences between the two (§ 26–30), and I shall hereafter succinctly notice the subject. Indeed, the former is altogether distinct from the latter, and should not be considered in connexion with it, farther than to point out the diagnosis.

23. In some constitutions, particularly the sanguineous, the irritable, and the nervous, the local lesions described above (§ 6), very soon after their commencement, create more or less constitutional disturbance and febrile commotion; while in others, as the phlegmatic or lymphatic, the melancholic or bilious, these lesions may have been of some continuance, or have proceeded far before general disorder is developed or becomes severe. The local change being the same, the constitutional effect will vary remarkably in grade, form, and course, according to these and other circumstances just mentioned. In some it will be rapidly developed; in others slowly, or after a precursory period of longer or shorter duration, or after several efforts to produce it. The earlier constitutional symptoms are often neglected by the patient, and are seldom subjected to the physician. Occasionally the patient experiences chills or rigours, more or less severe, almost immediately after sensations of pain or uneasiness. In rarer cases, morbid sensation is not produced until either during or after the rigours. This is observed most frequently in inflammations of internal organs. More commonly the patient complains, in connexion with pain, of uneasiness, or other morbid states of sensation referrible to a particular part, of weakness of the limbs, lassitude, general uneasiness, or lowness of spirits, of slight chills, formication, or of an alternation of slight chills and flushings. These may be the only precursors; or they may be attended by disturbed sleep, a whitish or loaded tongue, a clammy state of the mouth, with vitiated taste, want of appetite, constipation, &c. With these, the local symptoms are aggravated, and severe rigours or shudderings are more or less rapidly produced. The rigours are sometimes accompanied with nausea or vomiting. The countenance, general surface, and extremities, which were pale, harsh, or cold during the rigours and chills, soon afterward become warm; and the pulse, which was previously small or constricted, and but little accelerated, increases in quickness and volume. The consequent phenomena appear with a rapidity and severity varying with the intensity and extent of the local action. The secretions and excretions are diminished, and subsequently vitiated. The

skin is hot and burning, the face flushed; the tongue is white, furred, or loaded, and, with the mouth, somewhat dry or clammy; the appetite is gone; thirst is urgent; the bowels are constipated; the urine is scanty, high-coloured, clear, and emits a strong odour; and pains are often felt in the back, or loins, limbs, or head, in addition to those referred to the inflamed organ. The symptoms indicate general vascular excitement and its usual consequences, unconnected with depression of vital power or contamination of the fluids. When they are severe or intense, and when the energies of life become exhausted, delirium sometimes takes place, particularly at night; but it rarely appears early, unless the brain is the seat of inflammation, or readily sympathizes with the local affection, as in inflammation of the diaphragm or of fibrinous parts.

24. The acuteness of the general symptoms is not always in relation to the severity of the local changes; but, according to the intensity of either, or of both, will the type of the former be more manifestly continued. The less severe states of constitutional affection, and particularly when the local morbid action is neither extensive nor very acute, are characterized by exacerbations in the evening or night, during which the local symptoms are more or less exasperated, restlessness and want of sleep being generally present. In the morning the symptoms are ameliorated, and a tendency to perspiration appears. The course and duration of the constitutional affection vary with the severity and the seat of the local disease, and with the circumstances proper to the individual affected. The symptoms usually increase either gradually or rapidly, according to the nature of the exciting causes, the acuteness of the attack, and the circumstances just alluded to, until they arrive at a certain pitch or *acmé*, from which they decline more or less rapidly in some cases, and slowly in others. This change, whether taking place gradually and slowly, or suddenly and rapidly, depends entirely upon the state of the local affection. If the local symptoms gradually decline, the general disturbance subsides in a similar manner; and if any of the more unfavourable terminations of the local disease about to be noticed occurs, the system evinces the change, as will be hereafter stated.

25. *D.* Of the Changes observed in the Blood in Sthenic Inflammation.—These vary remarkably with the circumstances determining the severity, seat, and course of the disease. I have described them so fully in the article Blood (§ 96, *et seq.*), that little more need be here adduced upon the subject. Much importance has been attached to the existence of a *buffy coat*, and of a *cupped* appearance of the coagulum. These states of the blood are most frequently observed in the species of inflammation now being considered. But they are not always, nor even very generally present, nor at all stages of the disease in which they occur. They are even more commonly met with in some complaints which, although nearly allied to inflammation, are not purely inflammatory, as rheumatism. They have frequently a marked reference to the stage and seat of inflammation. In acute rheumatism they are very remarkable, and often become more so as depletions are repeated. I once witnessed a case of the internal metastasis of rheumatism, for which venæsection was repeated several times. The buffed and cupped appearances became more and more remarkable; and yet, upon examination after death, no signs of inflammation could be detected, and the internal viscera were quite bloodless. When, however, serous and fibrous structures are inflamed, these states of the coagulum very generally exist. During acute inflammation of cellular and mucous tissues they are much less frequently observed. When compound or parenchymatous structures are inflamed, they are met with chiefly in certain stages and states of the disease. When an important or vital organ is inflamed, and especially when the patient is plethoric and the circulation oppressed, these appearances often do not take place until the vascular load and oppression are removed, and the circulation is rendered free. There are various other circumstances which affect the state of the coagulum in acute sthenic inflammations, but they are noticed in the article just referred to. It is chiefly in the venous blood that *cupped* and *buffed* appearances have been seen; for the occasions of noticing them in arterial blood are comparatively rare, and unfavourable to their occurrence. They have, however, been met with in arterial blood by Gordon, Gendrin, and others.

[Mr. Addison claims to have established the following conclusions as connected with the blood:

"1. That the colourless corpuscles exist in the blood of man under all circumstances, and are constantly circulating through the capillary vessels, to the walls of which they have a tendency to adhere.

"2. That they exist in great numbers in the blood of inflamed parts; and that they may be seen accumulating in the irritated vessels of a frog's foot, and showing an increased tendency to adhere to their walls.

"3. That they exist in great numbers in the buffy coat of the blood.

"4. That the liquor sanguinis, especially that of inflammatory blood, *fibrillates* in coagulating, so that a thin film of it presents all the structural characteristics and physical properties of fibrous or membranous tissue.

"5. That lymph and pus globules, exudation cells, and epithelium, are altered forms of the colourless corpuscles." (*The Actual Process of Nutrition in the Living Structure demonstrated by the Microscope*, &c., by William Addison, F.L.S. Lond., 1844, p. 76, with 2 plates.) Dr. A. also maintains that neither the fibrin nor albumen of the circulating blood is diffused through its fluid portion, or liquor sanguinis; but that they are both contained in the colourless corpuscles: of these he supposes that a large proportion burst or become ruptured as soon as the blood is drawn from a vein, owing to the sudden change of temperature to which they are exposed, or from other causes; and that they set free the liquor sanguinis, which rises to the surface, drawing up with it the colourless corpuscles which have hitherto preserved their integrity. These views, however, appear to us hypothetical, and, considering the variety of appearances described by different microscopical observers, require farther con-

firmation. It is now well established, by the researches of Andral, Gavarret, and others, that an excess of fibrin and of the colourless or lymph globules exists in inflammatory diseases, especially those of a sthenic character, and acute rheumatism. In some cases fibrin has been observed in the proportion of 10 parts in 1000, the natural ratio being from 22 to 32. It is found in excess in tuberculous diseases, pneumonia, rheumatism, cellular inflammation, or simple phlegmon, phlegmasiæ of the mucous membrane of the respiratory and digestive apparatus, mercurial stomatitis, acute cystitis, acute inflammation of the skin, as in burns, erysipelas, &c.; also, of all serous membranes, lymphatic glands, and softening of the brain. As soon as inflammation begins, an increase in the fibrinous constituent of the blood is manifested. M. Andral supposes that the disease of the solid precedes the change in the blood; and that the occurrence of this latter explains, and is proof of inflammation being a general and constitutional disease. The sympathetic fever in the phlegmasiæ is, he thinks, due to the alteration in the blood by excess of its fibrin. —(Williams's *Principles of Medicine*, ed. by J. Bell. Phil., 1844.)

The increase of fibrin is so constant a phenomenon as to be regarded as a pathognomonic sign of inflammation, distinguishing it from other conditions that simulate it, and thus enabling us to detect it at an earlier period than could be done by either general or local signs, the degree of increase bearing a constant proportion to the extent of the inflamed part and to the intensity of the morbid action. But it is to be observed that there is not only an excess of fibrin, but an increase in its plasticity, or tendency to become organized; thence arises the rapid production of false membranes from fibrinous effusions, as well as from the more complete fibrous arrangement seen in the buffy coat, than that which the ordinary coagulum of blood displays. The increased proportion of the white or colourless corpuscles in inflammatory blood, and their special accumulation in the vessels of the inflamed part, has been abundantly shown by the independent observations of Gendrin, Gulliver, Addison, and Williams. There is every reason to suppose that the *white corpuscles* are *newly formed* immediately upon the application of an irritant; and Mr. Addison has shown that they have the character of true *cells*. The above facts seem to prove very conclusively that the increase of fibrin, and its more contractile and separating quality, originate in the vessels of the inflamed part, and must be regarded as an augmentation of the vital process of nutrition developed by inflammation.]

26. *The coagulation of the blood*, and the origin of the buffy coat of the coagulum, have been so fully considered elsewhere (see art. Blood, and my *Appendix* to Richerand's *Elements of Physiology*, p. 638), that I need adduce but little farther on the subject than to state the facts ascertained, and the inferences deduced from my investigations, and published in 1824, in the first edition of the *Appendix* just mentioned. The blood during life consists of serum, holding in suspension small, regular, and insoluble globules, each of which is composed of a central, colourless spheroid corpuscle, and a coloured envelope. The latter always continues to surround the former during life; but, as life departs, and as the motion to which it gives rise ceases, the attraction between the central corpuscles and their coloured envelopes no longer exists, the one completely separating from the other. The central corpuscles then obey the force which tends to unite them, and form a net-work, in whose meshes the liberated colouring matter, now detached from these corpuscles, becomes enclosed, and thus the coagulum is formed. These central corpuscles, in uniting into filaments or other forms, constitute the fibrin, which, as respects its constitution, is probably only a modified or more highly animalized albumen, which abounds more or less in the serum. When the coagulum of the blood is exposed to a stream of water, the colouring matter, detached from the central corpuscles, is washed away, while the corpuscles themselves remain aggregated in the form of fibrinous filaments. It is the various forms assumed by the aggregation or mutual attraction of the central corpuscles, in relation to the separation, deposition, or entanglement of the colouring matter, and to the appearances of the serum in which these changes take place, which constitute the phenomena of coagulation, and give rise to the appearances of the blood characteristic of inflammatory action. In addition to these facts, the following *inferences* as to the causes of the phenomena of coagulation may be abridged from my notes above referred to:

27. 1. The globules of the blood possess a rotatory motion during life, this motion continuing until shortly before coagulation takes place. 2. This motion is the consequence chiefly of the organic nervous or vital influence which is exerted by the ganglionic system on the heart and blood-vessels, and which is partially imparted to the globules. 3. This influence thus preserves the blood in a state of due fluidity. 4. The fluidity of the blood is hence a vital phenomena, or property *derived* from, and depending upon the vital conditions of the vessels in which, and the organs through which it circulates; the vital conditions of the vessels and organs depending, as shown elsewhere, chiefly upon the organic nervous influence. 5. The cause of the *coagulation* of the blood is not to be found in external agencies, but in the loss of the vital influence and motion of the globules, proceeding from the sources just assigned, the power exerted by the ganglionic upon the vascular system. 6. The presence of air, particularly the oxygenous portion of it, and several physical and chemical agents, hasten coagulation, while others delay or altogether prevent it. 7. When coagulation commences at any point of a mass of blood, it is rapidly propagated throughout the whole: rest favouring coagulation, while motion delays or prevents it. 8. The heat of the body and the strength of the circulation are not causes of the blood's fluidity, but are both results of the same cause, namely, the vital energy of the vessels, and vital endowment of the globules of the blood: both are co-ordinate, and both, as well as the phenomena connected with coagulation, are dependant on this source. 9. Coagulation occurs sooner in venous than in arterial blood; and coagulation of arterial blood is still longer de-

layed if it be prevented from leaving the arteries. 10. Coagulation takes place the sooner after the blood is removed from the vital sphere of the system, the weaker the vital energy to which it was subjected while circulating in the system. 11. The weaker the vital energy, and, consequently, the quicker the coagulation, the more lax is the coagulum which is formed. 12. Coagulation is more slow, and the coagulum more firm, the more energetic the vital action of the vessels. 13. As the central corpuscles lose their coloured envelopes soon after their removal beyond the sphere of the vital influence of the vessels, and as this is the first part of the act of coagulation following the loss of motion of the globules, so it may be inferred that the colouring matter continues to surround the central corpuscles in consequence of the vitality emanating from the interior of the vessels and endowing the globules; and that the separation of the colouring envelope from the central corpuscle is the result of the loss of a portion or of the whole of that vitality, and of the rotatory (1) motion which it occasions; and, as the loss of vitality may be reasonably supposed to be quickest where it has existed in the lowest grade, the separation of the coloured envelopes, and the attraction of the central corpuscles forming the fibrin, will be the quicker, the weaker the vital energy, and *vice versâ;* but the coagulum will be the more lax or imperfect, as shown by the facts already stated (10, 11). 14. Although the loss of the rotatory motion and of the colouring envelopes of the globules disposes the central corpuscles to attract each other, yet the attraction is weak in proportion to the depression of organic nervous or vital power endowing the vascular system at the time when the blood is abstracted; and in some inflammations, as well as in some other diseases, the depression may be so extreme as to deprive the central corpuscles of all power of uniting in the form of fibrinous filaments. In such cases these corpuscles merely mix with the serum like a gelatinous or albuminous matter, and either suspend the colouring substance, or allow its deposition to the bottom of the vessel; the central corpuscles separating imperfectly from the serum or combining with its albumen, or forming merely an almost colourless gelatinous mass in the upper parts of the coagulum. 15. The firmness of the coagulum is in proportion to the degree of organic nervous influence endowing the vascular system, and to the emanation which the globules themselves derive from this influence.*

28. From what is now advanced, the appearances of the blood in inflammatory and other diseases will be readily explained. When the organic nervous power is depressed or exhausted—as in asthenic inflammations, in typhoid and adynamic fevers, in the true infectious puerperal fever, and puerperal mania, in the worst forms of erysipelas and diffusive inflammation of the cellular structures, and in several other diseases, particularly when epidemic, or occurring in hospitals, the air of which is vitiated by crowding of the sick, and the decomposition of the discharges and secretions, as in lying-in hospitals—the blood taken from a vein will often not separate into a distinct coagulum and serous fluid, but will assume the appearance either of a black, grumous, sanious, semi-gelatinous mass, or of a straw-coloured jelly, at the bottom of which jelly the colouring matter forms a loose reddish brown, or blackish stratum. In such cases the blood, participating in the deficiency of the vital energy of the body, and being also, perhaps, deranged from the admixture of hurtful materials with it, which are not duly eliminated by the various emunctories, evinces the lowest grades of vital endowment, the attraction between the central corpuscles of the globules being too weak to form a coagulum and to exclude the serum, the colouring envelopes separating speedily from the central corpuscles, and forming a loose stratum at the bottom of the vessel.

29. It may be inferred, as corollaries from the foregoing, that the appearances which the blood exhibits have always an intimate relation to the vital conditions of the system, and to the excitement of the heart and blood-vessels; that the buffy coat is merely one of the manifestations furnished by the blood, indicating reaction of the powers of life, or excitement of the vascular system; that the blood participates in the vitality of the body, through the medium of the vessels and organs in which it circulates and that, according to the degree or condition of this vital endowment, coagulation and the coagulum are modified in their phenomena and appearances, and the production of the buffy coat promoted or altogether prevented. (See art. Blood, § 81, *et seq.*)*

* [Dr. S. L. Metcalfe has reduced the leading facts connected with the theory of coagulation to the following propositions (*Caloric, its Mechanical, Chemical, and Vital Agencies in the Phenomena of Nature*, 2 vols., 8vo, p. 1100. Lond., 1843):

"1. That the contractile power of the blood when removed from the body, like that of the muscular fibres, is in proportion to the quantity of respiration, mean healthy temperature, and aggregate vital energy in the different orders of animals; being greater in birds than in mammalia, and greater in the latter than in reptiles and fishes.

"2. That, as the temperature of arterial is higher than that of venous blood, so does the former coagulate more quickly and firmer than the latter.

"3. That, as the vital energy of animals is always diminished by reducing their temperature below their natural standard, so is the coagulation of the blood retarded by the same means, and wholly prevented by long-continued cold.

"4. That the blood of individuals belonging to the sanguine or dynamic temperament coagulates sooner and more firmly than in such as are of a weak or phlegmatic constitution, since its contractile power is diminished by whatever impedes the function of respiration, as in phthisis, asthma, disease of the heart, the cold stage of fever, and all maladies of long standing, by which the powers of life are greatly reduced" (vol. ii., p. 648). The work above quoted is one of the most remarkable of the age, for the great learning and ability it displays; being characterized by a deep philosophical spirit, profound sagacity, and immense research, there can be no doubt that it is yet destined to exert a most important influence upon medical science, and modify many existing opinions on physiology, pathology, and practical medicine.]

* [The changes observed in the blood in sthenic inflammation are thus ably summed up, in the *Brit. and For. Med. Rev.*, July, 1844, p. 103: "*a.* The quantity of *fibrin* in the blood undergoes a decided increase; the *plasticity* of the whole mass, therefore, but especially that of the liquor sanguinis, is greatly augmented. *b.* There is a corresponding increase in the proportion of *white* corpuscles, which are present in large amount in the vessels of the inflamed tissues, and have a great disposition to adhere to their walls; but which are also present, to an unusual amount, in the entire mass of the circulating blood. *c.* The increase in the proportion of fibrin is chiefly a local action, exerted on the blood during its passage through an inflamed part, and probably effected by the instrumentality of the *white* corpuscles. *d.* There is usually an increase, not only in the *quantity* of fibrin, but in its *plasticity* or tendency to become organized, as shown by the greater perfection of the fibrous structure into which it passes in coagulating. This

30. ii. Of CHRONIC INFLAMMATION.—Inflammation may affect any tissue or organ in so mild and obscure a form from the commencement as to proceed for a long and indeterminate period; and, in many cases, to escape detection for a long time, owing to the slightness and gradual progress of the phenomena constituting the inflammatory act. This may be termed *Primary Chronic Inflammation*. The chronic form of inflammatory action is, however, frequently observed to follow the acute disease; the latter, owing to diathesis, treatment, premature exposure, and to the operation of injurious agents before recovery had taken place, only partially disappearing, or degenerating into a milder and more prolonged state of action. This state may be called *Consecutive Chronic Inflammation*.

31. *A*. The *Local Symptoms* vary remarkably with the mildness or severity of the morbid action; for, as the term *chronic*, as well as *acute*, is merely conventional or relative, both marking extremes of action, between which every intermediate grade is to be found, each of the phenomena already described, as characterizing sthenic inflammatory action, appears in different states of development in different cases and circumstances. Generally speaking, however, all the local symptoms are much less severe than in the acute disease, and sometimes so slight as to escape detection. *Pain* is occasionally absent, or is so slight as not to excite attention. *Redness* is also sometimes slight, or not very remarkable. The *temperature* is not much elevated; it is often not above the natural standard. *Swelling* is frequently slight, but it is sometimes very considerable; and throbbing is seldom complained of. The *functions* of the organ or part affected are generally more or less disordered; but in some instances the disorder is slight, or even escapes detection. This is especially the case when a portion only of an organ or part is chronically inflamed. When an internal organ is thus affected, it is chiefly by the presence of disordered function, and by the constitutional or sympathetic effects of the morbid action that the nature and seat of the disease can be detected.

32. *B*. The *Constitutional Symptoms* are often slight and obscure, sometimes prominent and characteristic. *Febrile Symptoms* are not always present; and, even when most manifest, they are rarely of a continued type. They are generally remittent, or almost intermittent, the exacerbations being preceded by languor, uneasiness, or slight chills, followed by increased frequency of the pulse, by thirst, dryness of the mouth, and heat of skin. These symptoms come on in the evening, impair the rest, and subside in the morning, either with or without perspiration. The general health is more and more impaired, the strength fails, the flesh wastes, and the complexion waxes pale, sallow, or unhealthy. If the generative or urinary organs are the seat of the disease, various nervous or sympathetic symptoms are present; and if matter forms, or ulceration takes place, the chills become more severe, the febrile exacerbations terminate in copious perspirations; the urine is thick after standing, or deposites a sediment; emaciation proceeds more rapidly, and hectic fever is established.

33. iii. PROGRESS AND DURATION.—The prog-

---

may consist in an increased attraction between its particles, which continues to operate for some time, causing contraction of the fibrous net-work, subsequently to its first production. *e*. There is also an increased attraction between the red particles of blood, causing them to adhere together in rolls more firmly and for a longer period than they do in healthy blood. *f*. To these two causes, usually aided in their operation by the slowness of the coagulation, all concurring to produce an increased tendency to separation between the red corpuscles and the liquor sanguinis, we may ascribe the production of the buffy coat of inflammatory blood. *g*. The increased *plasticity* of the blood is so constant a phenomenon of inflammation, that it may be regarded as essential to the presence of that state.

"II. *a*. On the other hand, the *formative power* of the inflamed TISSUES appears to be diminished; their usual functions, whether of nutrition or secretion, being completely checked, or insufficiently performed, or perverted in their character. *b*. While, therefore, an over-production of fibrin is taking place in the blood, there is diminished consumption or appropriation of it in the tissues. *c*. If the inflammation be severe in its character, the vitality of the tissues is so diminished as to cause, not only a cessation of their formative actions, but also an increased tendency to disintegration, as shown in *suppuration* and *ulceration*; or positive death of a large part, as in *gangrene*. *d*. The depression of the vitality of the tissues sometimes appears to result from a previous over-excitement of it, as when inflammation follows excessive use of a part, or the application of stimulants to it; but it is sometimes the consequence of some directly sedative action, as that of cold. *e*. Hence both *determination* of blood and *congestion* have a tendency to produce inflammation; the one being a state of over-excitement, which is very prone to occasion subsequent depression, while there is at the same time a tendency to increased production of fibrin in the blood, the other being itself a state of depression of formative power in the solids, but not passing into inflammation, unless there be at the same time an increased plasticity of the blood.

"III. *a*. The MOTION OF THE BLOOD in the capillaries of the inflamed part is greatly retarded, as we might have anticipated from the impairment of the functional operations of the solids. There may even be a total stagnation of the blood in the capillaries of a considerable portion of the tissue, which will be followed by its death and disintegration. The degree of stagnation will depend upon the amount of the depression of the vitality of the surrounding parts. *b*. The motion of blood through the vessels in the neighbourhood, however, is more rapid than usual, and these vessels are themselves enlarged; so that the total quantity which passes through an inflamed member in a given time is greater than usual. *c*. The vessels are enlarged both *in* and *around* the inflamed part, in consequence of a diminution of the tonic contractility of their walls, which causes them to admit of abnormal distention by the impulse which the blood receives from the heart. This diminution is another evidence of the depression of the vital properties of the solid tissues in an inflamed part.

"IV. *a*. The PRODUCTS of inflammation differ from those of the ordinary processes of nutrition and secretion, not so much in their materials as in the nature of the change which these have undergone. *b*. When the intensity of the inflammatory process is moderate, the *liquor sanguinis*, containing an unusual proportion of fibrin, and possessing a high degree of plasticity, is effused into the neighbouring tissues or upon the neighbouring surfaces, being generated, by the local actions of the part, faster than it can be withdrawn by its formative processes. By the organization of which it is susceptible, when in contact with the living solids, it spontaneously assumes the form of simple fibrous tissue, constituting false membranes on the surface, or consolidating the substance into which it is effused. *c*. If the inflammatory process goes no farther there is no disintegration of the original tissue; but if its vitality be too far depressed it dies; and the changes which it consequently undergoes impress themselves upon the fibrinous effusion. The fibrin loses its vital power of coagulation, and in this aplastic state becomes the chief ingredient in the *liquor puris*; while the cells (*pus-corpuscles*), which are found floating in it, resemble the white corpuscles of the blood in a degenerated form. *d*. When the inflammation is very severe, and the stagnation of blood in the capillaries of the part is complete, an entire loss of vitality in the whole tissue at once, or *gangrene*, is the result. Gangrene does not originate, however, in inflammation alone, since any other cause, such as the long-continued action of cold or pressure, interrupting the capillary circulation, or obstruction to the supply of blood through the arterial trunks, will equally produce it, by the suspension of the formative processes thus occasioned. But unless some degree of inflammatory action, that is, an increase in the plasticity of the blood, be set up at the same time, there is an indisposition to the formation of the line of demarcation between the sound and the dying parts, and the gangrene has a tendency to spread."]

ress and duration of sthenic inflammation are influenced by the constitution or diathesis, habits of life, age, and sex of the patient; by the structure or organ affected, and by the treatment and influences to which the disease is subjected. The sanguine and irritable temperaments, a full and robust habit of body, and youth or the vigour of age, not only impart a sthenic character to inflammation, but also cause it to assume an acute or active form, or to run its course rapidly. A similar effect is favoured by parts which are naturally vascular, and supplied abundantly with nerves, or endowed with high sensibility, and especially if they be placed near the centre of the circulation. On the other hand, the melancholic, leucophlegmatic, and nervous temperaments, the scrofulous diathesis, an advanced period of life, and the female sex, prolong the progress of inflammatory action, and cause it to assume, either primarily or consecutively, a latent, languid, or mild and chronic form. Structures endowed with little vascularity, and with a low grade of sensibility, as tendons, ligaments, fasciæ, and bones; also parts far removed from the centre of vitality and of circulation, as the extremities, are most prone to inflammation of a slow and chronic character.

34. The patient's habits of life have a remarkable influence in determining the character of inflammation from the commencement, in favouring the passage of the acute into chronic disease, and in disposing the latter to assume the former state. Full living, and the use of much animal food, or of exciting and intoxicating liquors, have these effects especially, and not only prolong or aggravate the morbid action, but also cause its unfavourable termination. Similar results are also produced by injudicious treatment; by exposure to a close, miasmatous, foul, or unhealthy atmosphere; by certain epidemic constitutions of the air, depending upon electrical conditions, or other circumstances; by mental anxieties and perturbations, and improper or premature exercise or excitement of the functions of the part affected. These not only prolong or aggravate acute inflammation, but also render its terminations more unfavourable than they otherwise would have been, and cause slight or chronic inflammatory action to pass into the acute and active state.

35. The circumstances just alluded to render the *duration* of sthenic inflammations quite indeterminate. The active and acute states may continue but a short period, but two or three days, or even not so long, until one or other of the terminations about to be described takes place; and the slight or chronic state may endure months, or even years. Between these extremes, every intermediate term of duration, as well as grade of action, may be seen. The duration depends chiefly upon the organ affected, acute inflammation in vital parts, especially the stomach and bowels, terminating most rapidly.

36. iv. The Complications of sthenic inflammations deserve some notice, although hitherto the subject has received no attention from pathological and practical writers, owing manifestly to the "*verba magistri*," the dictum of Hunter, that two diseases cannot co-exist in the same frame. This, however, does not apply to inflammations, and hardly to other diseases, not excepting even specific contagions. The one morbid action may mask or absorb the other, but the one that predominates has its principal features somewhat modified by the association. In cases of chronic inflammation, particularly in females, and in young or nervous subjects, the sympathetic disturbance produced by it will often attract the chief attention of the patient, and also of the physician; and a disease, truly depending upon inflammatory action, in some one of its grades, may be viewed as nervous, spasmodic, or functional. This most frequently applies to inflammations of the uterine and urinary organs, of the cerebro-spinal masses, and of the digestive mucous surface; and is fully illustrated in the articles Hysteria, Hypochondriasis, &c.

37. When a vital organ is inflamed, either acutely or chronically, other parts sympathize more or less; and when the inflammatory action is slight, the affected organ may not manifest the disorder by characteristic phenomena, the sympathizing parts actually presenting the chief disturbance. Parts, also, which were at first only sympathetically affected in their functions or sensibility, may either, from the severity, or from the continuance of such affection, become more and more seriously diseased, until the structure is changed, and thus what was merely a symptom increases to a morbid association, and, lastly, to a true complication, or even, ultimately, becomes the principal disease, the primary inflammation subsiding, or entirely disappearing, as the consecutive complication is developed. Instances of this are not infrequent in respect of inflammations of the lungs, pleura, pericardium, and heart, the disease originating in either, and extending to the others, the primary affection being masked by the consecutive disorder, and sometimes ultimately absorbed by it. Such occurrences still more frequently take place when any one of the abdominal viscera is inflamed; two or more of them becoming consecutively affected, the disease either continuing for a time to co-exist in them, or disappearing from the one as it is developed in the others.

38. The complication of inflammations with each other, or with nervous, spasmodic, or convulsive disorders, or even with hæmorrhage, is much more common than is usually supposed, the latter often depending upon the former, particularly when the inflammation is chronic, slight, or latent. In such cases, the passage of the disease into a more acute or active form becomes an advantage, by disclosing its nature. Such complications are frequent in childhood, and in females, particularly during the puerperal states. Many of the convulsive affections of the former derive their origin, in a large proportion of cases, from inflammatory action; and most of the nervous, spasmodic, painful, and hysterical disorders of the latter arise from inflammatory action of a slight and chronic form in the uterus, ovaria, or urinary organs.

39. v. Terminations and Consequences.—Inflammation, correctly speaking, terminates only in *two* ways: in *resolution*, or the recovery of the healthy state of action; and in *gangrene*, or the death of the inflamed part. The other morbid conditions, improperly ranked as terminations, are merely *consequences* of inflamma-

tion, the morbid vascular action giving rise to them still subsisting in most instances in some one or other of its forms.—*A.* When inflammatory action terminates in *resolution*, the phenomena subside very nearly in the order in which they appeared. Pain ceases, the redness and heat diminish, the swelling subsides gradually, and the functions slowly return. In many cases, however, the swelling continues with little diminution for a considerable time, and the functions of the part are restored with equal slowness; the recovery of the impaired tone of the capillary vessels, and the absorption of the sero-albuminous fluid effused in the areolæ of the tissues, being necessary to the subsidence of the swelling, and to the restoration of function. This termination may be looked for when the inflammation does not proceed too rapidly; when the pains are neither acute, lancinating, nor throbbing; when the symptomatic fever gives rise to a general and copious perspiration, and when the urine deposites a sediment.—*B.* The termination of inflammation in *gangrene* is so fully discussed in that article that nothing farther need be advanced respecting it at this place. (See art. Gangrene, § 3, *et seq.*)

40. *C.* Of the *consequences* or *results* of inflammation, the most important are, *exudation*, *softening*, *suppuration*, *ulceration*, *induration*, *thickening*, and probably other organic changes. Several of these are treated of in separate articles, a simple reference to which, at this place, will be sufficient.—*a. Exudation* or *effusion* is the earliest and most common consequence of inflammatory action, the swelling, constituting one of the chief characters of inflammation, being caused by it chiefly. Exudation is the deposition in the areolar tissue, in the parenchyma of an organ, in a cavity, or upon some surface, in consequence of excited vascular action, of a fluid consisting chiefly of the natural secretion of the part, greatly increased in quantity, and remarkably altered in its properties and appearances. This exudation sometimes commences at a comparatively early stage, but most commonly it becomes abundant at an advanced period, or even towards the close of the morbid action; and it occasionally favours a resolution of this action, but not infrequently some degree of inflammation still subsists with it. The fluid which is exuded or effused varies in its characters with the structure affected, and with the degree or activity of the morbid action producing it. Something, also, depends upon the function of absorption in the part; for when it is active, and the more fluid parts of the exudation are thus removed, the state of the remaining parts will be thereby much modified. Hence the fluid is serous, sero-albuminous, flocculent, turbid, liquid, thick, or partially consistent, ropy or glairy, coagulated, adherent, albuminous, or even membranous or fibrinous. The fluid exuded in inflamed cellular or parenchymatous structures is generally serous, turbid, sero-albuminous, or flocculent, but becoming more consistent, albuminous, or otherwise changed as absorption proceeds. That which is exuded from inflamed serous surfaces is either fluid and transparent, or turbid and flocculent, or thick, semi-coagulated, and albuminous; films or layers of lymph, or of albuminous matter, covering the affected surface, or agglutinating opposite parts. The fluid exuded from mucous surfaces varies in different situations, and as the follicles or the mucous membrane itself is principally affected. Hence the morbid secretion is watery or thin; or mucous, thick, and opaque; or glairy, ropy, gelatinous, and transparent; or muco-puriform, or sanguineous; or muco-albuminous, or consisting chiefly of an albuminous lymph.

41. The intensity or activity of inflammatory action influences not only the quantity, but also the nature of the effused fluid. When this action is weak or slight, the fluid is chiefly serous; and in proportion as it is more active or severe, the effusion is more albuminous, and presents the characters of coagulable lymph. But the effused fluid is also much modified by the constitution, diathesis, and habit of body of the patient, and by the vital and physical influences to which it is exposed for a time after its effusion. When the fluid is retained for some time in contact with surfaces which exuded it, the more watery portion is absorbed, and the albuminous part or the lymph becomes more plastic and solid, and, ultimately, even organized. This is shown especially in chronic and sub-acute inflammations of serous membranes. Even in mucous surfaces, as in the fauces, larynx, and trachea, the albuminous fluid exuded during inflammation is changed, not only by a partial absorption, but also by the evaporation during the constant passage of the air over the parts during respiration. The scrofulous, the gouty, and the rheumatic diatheses farther affect the quality of the fluids effused from inflamed surfaces; but still more depends upon the intensity of the general vascular disturbance, in connexion with the state of vital power. When the former is energetic and the latter unimpaired, then the effused fluid is albuminous, and abounds in coagulable lymph, a *formative* as well as a *reparative* process frequently resulting therefrom; a formative process often appearing from inflammation of serous membranes, and a reparative process after the division or wounds of parts. When the febrile and vascular disturbance is great, and organic nervous or vital power is much impaired, the fluid effused is watery, sanious, turbid, septic, offensive, &c., the morbid action being incapable of effusing a fluid sufficiently coagulable to be the medium of adhesion between opposing surfaces, or to limit the spread of the morbid action to surrounding parts. Hence inflammation, in these circumstances, assumes the asthenic, spreading and disorganizing characters about to be considered. One of the chief and most important features of sthenic inflammation is its disposition to exude a fluid more or less coagulable, by which parts adhere and unite, and which even becomes organized, and arrests the extension of the inflammation, as well as limits the destruction or disorganization of the parts in which it commenced.

42. Albuminous or coagulable matter exists in the fluids effused or exuded by sthenic inflammation in various proportions. In the more liquid effusion, it is in small quantity, and is separated from the serum which suspends it, or holds it in solution by heat and by the mineral acids; but of the more solid or consistent exudation, it constitutes the principal part. Be-

tween these extremes it is found in every proportion. In puriform matter and pure pus albumen exists in the form of minute corpuscles, or globules, swimming in a turbid serous fluid. In this, as well as in the more fluid states in which albumen presents itself, it is incapable of organization; but, in the more solid or plastic state, it often becomes organized, and is the bond of union between divided parts, when the powers of the constitution and the condition of the circulating fluids admit of its production. Salutary or reparative effects, from the effusion of coagulable lymph, are evinced also by its effusion around *abscesses*, by its agglutinating serous membranes, when morbid formations, ulceration, and purulent matter are about to perforate them; and by its obliterating arteries or veins, after ligatures or in circumstances where dangerous hæmorrhage would otherwise occur. (See Abscess and Adhesions.)

43. *b. Softening* is a very general consequence of inflammation, and one of the earliest which attends it. Indeed, inflammatory action seldom continues long, particularly in an acute form, without impairing more or less the vital cohesion of the tissues affected. It often precedes suppuration, and it generally increases the disposition to effusion. It is most remarkable in mucous and cellular parts, and in parenchymatous organs, particularly the brain, lungs, liver, &c., these becoming more friable as well as softer than natural. But softening from this, as well as from other morbid conditions, is fully considered in the *article* devoted to the subject.

44. *c. Suppuration* is the natural result of inflammation when it is allowed to attain a high degree of intensity, especially in cellular, parenchymatous, and mucous structures. *Pus*, the product of the suppurative act, is apparently produced from the albuminous part of the blood by an altered state of the vital condition of the capillaries. It is very difficult to show satisfactorily in what this alteration consists; but it probably is impaired tone, or deficient vital contractility of the capillary vessels, the arterial branches supplying them being still more or less excited. Suppuration may be viewed as a true act of secretion; although pus, as it usually appears, is somewhat changed in the course of its production by absorption, by the vitality of the parts with which it remains in contact, by temperature, and by evaporation. The small, whitish flocculent masses often found in the purulent matter consist chiefly of a more concrete albumen secreted by the inflamed part. Although suppuration chiefly takes place in the structures mentioned above, yet it sometimes is seen in other parts, especially in the cavities of joints, and more rarely in serous surfaces. In these situations, particularly in serous membranes, it is generally a result of intense action in connexion with deficient power.

45. Mr. Hunter was the first who recognised with any degree of accuracy the changes which take place in the blood and in the capillaries of an inflamed part during suppuration, inasmuch as he considered that pus was a remove farther from the nature of the blood than the matter formed by adhesive inflammation—than coagulable lymph; and M. Gendrin is of the same opinion. The formation of pus in an inflamed surface or tissue takes place as follows, according to the observations of Kaltenbrunner, Gendrin, Carswell, and the author. In the field of a microscope the inflamed capillaries seem uniformly red, and the circulation in them is retarded or has ceased. Serum and coagulable lymph are effused in the areolæ of the tissue; and, if the inflammation is very intense, the exuded fluid is more or less coloured by the exudation of red globules or of blood. The whole of the inflamed part is quite opaque. As soon as suppuration commences, the red colour begins to disappear in various points, giving place to a yellowish granular-like matter in the capillaries, and connecting cellular tissue. In the centre of the inflamed tissue, several of the capillary vessels, which were obscured by the accumulated blood, reappear, some containing red, others yellowish-gray globules, which gradually become more distinct, increase in number and size, begin to move slowly, and, traversing the capillaries, arrive at the surface of the tissue, or at the edges of the solution of continuity, if this has occurred, in the form of globules of pus (Carswell). Gendrin states that he has distinctly seen the globules of blood, after stagnating in the capillaries of the inflamed part, losing their colouring envelopes, becoming opaque, and assuming a grayish yellow colour, approaching to that of pus; and that he has traced them moving slowly in the capillaries, and, as they advanced to the suppurating surface, gradually acquiring all the characters of pus. The observations of Kaltenbrunner agree with those of Gendrin as to the transformation of the blood-globules into the globules of pus, and as to this taking place *within* the capillaries; but they also seem to prove, what I have observed in several instances, that the red globules, or blood, exuded in an intense state of inflammation into the areolæ of the tissue, undergo a similar change to that which takes place within the capillaries when the circulation becomes stagnant in them; and that pus may thus be formed *without*, as well as *within*, the capillaries of an inflamed part, the fluid portion of the secretion consisting of the serum of the blood. Kaltenbrunner even supposes that not only the blood of the inflamed tissue, but likewise a part of the tissue itself is converted into pus-globules. But I believe that this takes place only where suppuration is followed by *ulceration* (§ 48), or where an ulcerated surface secretes a puriform fluid.

46. From these facts it is evident that, in an inflamed part, certain changes precede the formation of pus: 1st. A loss of the vital tone, or a change of vital action in the extreme capillaries. 2d. A retardation or stagnation of the circulation, and partial coagulation of the blood in them. 3d. A change of the blood-globules into pus-globules, and the discharge of the latter with a portion of serum on the suppurating surface. 4th. A similar change of the globules of blood extravasated in the inflamed part, these globules losing their colouring envelopes, and becoming the globules of pus. As connected with the subject of suppuration, some notice might be taken of the presence of pus in the general circulation, or in situations remote from the seat of inflamma-

tion; but as this belongs rather to the translation and metastasis of inflammation—to consecutive inflammation, it will be considered hereafter.

47. *Pus*, or purulent matter—the product of suppuration—is a slightly unctuous fluid, of the consistence of thin cream, which it otherwise resembles. It is generally of a whitish or pale yellowish colour, and of a mawkish or sweetish taste. It is nearly inodorous when cold, but when heated it emits a faint, sickly, and unpleasant odour. Under the microscope it presents corpuscles or particles swimming in a serous fluid. These corpuscles resemble the central corpuscles of the globules of the blood, deprived of their colouring envelopes, and consist of a highly animalized albumen.* The serous part of the secretion differs but little from the serum of the blood. In many situations, pus is mixed with the more natural secretions of the part, the latter being either altered in their characters or increased in quantity. This is especially the case in acute inflammations of mucous surfaces, the fluid excreted consisting of pus and mucus in variable proportions. The other relations of suppuration are fully considered in the article Abscess.

48. *d. Ulceration* is distinguished from suppuration chiefly in its being attended by a loss of substance—by a destruction of parts, and by a more or less abundant secretion of a puriform, ichorous, fœtid, sanious, and variously-coloured fluid. It may immediately result from inflammation, or be consequent upon suppuration, or the formation of an abscess. It depends chiefly upon causes connected with the treatment of the part in the earlier stages of inflammation; upon the diathesis, habit of body, or existing constitutional vice, as scrofula, scurvy, syphilis, and upon the state of the digestive and excreting functions. Ulceration is always preceded by softening; by a loss of the vital cohesion of the tissue inflamed, at the surface or part most remote from the centre of circulation, or at the termination of the capillary vessels. Along with the softening there is also a more or less copious effusion or exudation of a serous fluid, in which the organic molecules, which have lost their vital cohesion, are liquefied or suspended. Hence the discharge is ichorous, offensive, sanious, or coloured. In the more rapid or phagedenic states of ulceration, and when the discharge is scanty, and in parts covering abscesses, very probably the organic molecules are absorbed nearly as fast as they lose that degree of vital attraction necessary to their cohesion in the diseased surface. From this, the relation of ulceration to sphacelation and gangrene, particularly hospital gangrene, is apparent. (See art. Gangrene.)

49. When an ulcerated part begins to return to a healthy state of action, the diseased secretion becomes more puriform or albuminous, and an attempt is made to restore the loss of structure by a process called *granulation*. The vessels of the ulcerated surface acquire a more sthenic action; the disposition in the tissues to lose their vital attraction or cohesion is arrested; and the secretion assumes at first a puriform, and afterward an albumino-puriform character; the albuminous or coagulable portion of the secretion coating the inflamed surface protecting it, and ultimately becoming organized or partially identified with it. These changes in the ulcerated surface are evidently brought about by an improvement in the organic nervous influence of the part; and hence the success of a treatment, general and local, calculated to restore or to promote the energy of this influence, especially through the medium of the digestive and respiratory organs.

50. *e. Induration* and *thickening*, or *hypertrophy* of structures, consequent upon inflammation, are discussed in the articles on these lesions. It is unnecessary to offer any farther remark respecting them, than that they are generally consequences of chronic inflammation, and of acute or sub-acute inflammations which have passed into the chronic state. They may also be referred to the exudation, into the areolar tissue, of a sero-albuminous fluid, the more serous parts having been absorbed, and the albuminous parts organized or assimilated to the structure including them. From this source other organic lesions may arise, according as the exuded matters undergo a more or less complete organization, or according as they are retained in the state of merely minute amorphous masses disseminated in the areolæ of the structures, and are preserved from dissolution or change by the vitality of the surrounding parts. See arts. Induration and Hypertrophy; also Disease.)

51. II. Varieties or Modifications.—Having described inflammation as occurring in a previously healthy constitution, or in its *sthenic form*, and having viewed this as the more usual and standard condition of the disease, whether appearing in the *acute*, *chronic*, or *intermediate* states, it becomes necessary to consider the *alterations or deflections from sthenic inflammatory action*, occasioned by the previous health or the existing constitution of the patient, and by the nature of the predisposing, the exciting, and the concurrent causes. Many of the lesions of vascular action arising from these sources are so different from the true sthenic condition now discussed, as to admit of doubts as to the propriety of viewing them as inflammations; yet they have intimate relations to the sthenic disease, inasmuch as they possess nearly the same local characters as it, and often in a very remarkable degree—as they differ from it merely in kind, and often by slight shades only—as they may be converted into it by a general and local restora-

* [These globules are obviously a modification of the exudation corpuscles; each consists of a fluid, with granules and molecules contained within a thin cell, which sometimes has granules also on its surface. The granules render the appearance of the investing cyst or cell obscure; but its existence is clear from the action of distilled water, which causes the cell to dilate (by *endosmosis*) to double its former size; and what is curious, the contained granules swell also, which shows their vesicular nature (Williams). Pus globules are larger than the general size of exudation corpuscles, and exceed in size the blood discs (Gulliver). According to Mr. Addison, they measure from $\frac{1}{2000}$ to $\frac{1}{1500}$ of an inch; besides, in size they differ from other exudation corpuscles in being more distinctly vesicular, and containing a fluid as well as granules. Their more readily swelling, bursting, and shedding their contents under the influence of water or the solution of potass, may be referred to the same difference. This probably imitates the process by which the exudation corpuscle is converted into a pus globule. From a peculiar constitution, either of the corpuscles or of the adjoining fluids, the disposition to endosmosis is increased, and the corpuscles, and even their contained nuclei, swell into vesicles, instead of remaining in the gelatinous condition which characterizes the corpuscles within the blood-vessels and in coagulable lymph (Williams).]

tive treatment, and as the sthenic disease may be reduced to some one of these lesions by various depressing influences or contaminating agents.

52. In the view just taken of sthenic inflammation, we have seen merely different *grades* of action, the disease being *acute* or *chronic*, or some intermediate state, usually called *subacute*, according to the degree of *severity* or of *activity* presented by the morbid action, relatively to the constitution and powers of the patient. While the term *active* has been applied by many to the more acute states of sthenic inflammation, the word *passive* has been used as synonymous with the chronic conditions. To the former of these appellations, and to its application, little objection need be urged; but the latter is by no means applicable to any state of inflammation, neither to the chronic states of sthenic inflammation, nor to the *asthenic varieties* about to be considered.

53. With the increased local and general vascular action, constituting the states of inflammation above described, the constitutional powers are not much reduced or otherwise altered, nor are the depurating functions impaired, nor is the blood materially vitiated or deteriorated, in the early stages at least, or until the disease approaches an unfavourable termination. But in the varieties about to be noticed, the powers of life are much depressed or otherwise deranged from the commencement, the depurating or excreting functions are interrupted, the blood more or less altered, and the nervous sensibilities increased. Hence vital resistance to the changes consequent upon increased susceptibility and diseased vascular action is greatly impaired, and disorganization rapidly supervenes, and as speedily proceeds, unless arrested by the most efficient means. To these circumstances, however produced, are to be imputed those alterations or deflections, from the sthenic or true form of inflammation, that frequently present themselves in practice, with characters varying with the cause and seat of the disease, and with the peculiarities of the patient. As the inflammations already described present no obvious loss of power in their earlier stages, or until their terminations, and are therefore justly termed *sthenic*, so those about to be considered may be generally denominated *asthenic*, from the want of organic nervous energy and the loss of vital resistance to the progress of disorganization which they usually present, unless controlled by judicious treatment. They have also been denominated *typhoid*, *venous*, *erythematic*, and *erysipelatous*; but these are chiefly specific terms, the generic appellations, *spreading*, *diffusive*, *disorganizing*, or *asthenic*, being more appropriate.

54. i. Of Asthenic Inflammations.—*A. Of the Local Alterations, or Characters.—a. Uneasy sensation*, or *pain*, is the earliest, and sometimes the most remarkable symptom, particularly when serous membranes or circulating vessels are affected. When the disease is caused by external injury, by the inoculation of morbid matters, as in punctures during dissection, the pain is often early and acutely felt, even in cellular parts, although no other change has yet appeared. In nervous, susceptible, and weakened persons, the pain is so acute as to accelerate or increase the restlessness or delirium consequent upon the constitutional symptoms, which are often remarkably severe compared with the apparent small extent of the local disease, especially when caused by an animal poison. Pain, however, is frequently not very severe in certain forms of asthenic inflammation, particularly when parenchymatous organs are their seat, and when they are consequent upon some disease which has lowered or exhausted organic nervous power and sensibility. The inflammations which complicate or appear in the course of continued fevers are illustrations of this; and the metastasis of erysipelas, or the transference of inflammation from an external part to an internal organ, seldom gives rise to much pain. The amount of uneasy sensation depends chiefly upon the tissue implicated, upon the exciting cause, upon the constitutional susceptibility of the patient, and upon the state of the blood. In cellular, mucous, and yielding structures, it is sometimes slight, particularly if the purity of the blood is impaired by imperfect excretion, unless the inflamed and turgid parts be partially strangulated by aponeurotic expansions, or other unyielding textures, as in diffusive inflammation of the *cellular tissue*, and in various states of *erysipelas*. In this latter, and in inflammation of the lymphatics, the pain is generally tensive, burning, or stinging, and occasionally remittent. There are always great tenderness and sensibility to the touch, unless the affected parts are deeply seated.

55. *b. Redness* and *vascular injection* are always very remarkable. The former often either rapidly passes into a deep, dark, brownish-red, livid, or purplish hue, or presents more or less of either of these from the commencement. It is sometimes of a pale or yellowish red tint. The vessels are injected and distended, and the current of circulation through them is slow or impeded. The already dark hue of the blood is farther deepened by this congestion, and the exudation of the serous portion of it is facilitated by the weakened state of the vital cohesion of the tissues, by the impaired tone of the capillaries, by the increased frequency of the heart's contractions, and by the diminished crasis of the blood itself. The discoloration and injection of the part in the various asthenic states of inflammation are generally indices of the extent to which the vital tone of the vessels and tissues is exhausted, and the blood, especially that circulating in the part, is altered.

56. *c. Increased temperature* is present chiefly at the commencement of asthenic inflammation, and when membranous tissues and circulating vessels are attacked. Even in these cases, at an early period, the actual rise of temperature in the affected part is often not greater than on the surface of the body generally. Where the febrile disturbance is great, the pulse very quick and the skin dry, the heat of the general surface and of the diseased part is very considerable; but it is also peculiar, as observed in typhoid and malignant fevers; it seems to be greater than it really is, and is attended by a stinging, harsh, and unpleasant sensation. As effusion into the areolar tissue of the part proceeds, and as the swelling extends, little or no increase of heat is usually

observed; and sometimes the temperature of the part may even be lower than that of the surface of the trunk, or even lower than natural.

57. *d. Swelling* is considerable, and sometimes very great when cellular or parenchymatous tissues are affected. It is caused at first by the relaxation of the vital tone of the capillaries and tissues, and by the injection of the former; but consecutively, and chiefly by the effusion of serum from the diseased vessels. The swelling is always diffused, is disposed to extend itself, and is never acuminated or convex. It is generally soft, sometimes boggy or œdematous, and never elastic or hard, unless from the tension occasioned by aponeurotic or unyielding structures stretched over the swollen part. In mucous and serous membranes it is much less manifest, although existing more or less; and, in them, it is owing chiefly to the distention of the capillary vessels, and to the relaxation of the tissues themselves.

58. *e.* The *secretions* and *functions* are always disordered by asthenic inflammation: the former are altered and generally increased in quantity; the latter are remarkably impaired. When a secreting membrane or surface is attacked by it, the discharge is variously changed from the healthy state, the change obviously arising from the impaired state of vital power, the morbid condition of the blood, and the acceleration of the circulation. The effusion generally consists of a foul, dark, turbid, ichorous, septic, sometimes whey-like fluid. In puerperal females it is often remarkably abundant, and contains much curd-like or semi-coagulated matter, partially separated from a turbid or whey-like serum. This watery, serous, or ichorous fluid is also abundantly effused in the areola of the asthenically inflamed cellular tissue (see *Diffusive Inflammation of* Cellular Tissue); and, owing to the deficiency or absence of coagulable lymph or albumen, it readily spreads to, and infects or contaminates the surrounding tissues. This is one of the chief characters of asthenic inflammation, its *spreading* or *diffusive nature*, especially, resulting from the states of general or local vital power, and of vascular action, which are insufficient for the formation of coagulable lymph, by which the local disease may be limited.

59. The secretions from glandular organs are also remarkably altered in quality as well as in quantity; but their quantity is as often diminished as increased. Sometimes they are nearly or altogether suppressed, particularly in extreme cases of the disease, manifestly owing to the loss of organic nervous influence or vital power in connexion with the distention of the capillaries. When the substance of the liver is the seat of asthenic or diffusive inflammation, bile is either not secreted, or is absorbed as soon as it is secreted, giving rise to one or other of the forms of Jaundice (§ 28) described in that article as consequent thereon. The swelling, also, caused by the distention of the diseased vessels, and by the effusion into the parenchyma of the organ, is so great as to press upon the ramifications of the ducts, and to prevent the passage of the fluid along them as it is secreted. This is especially the case when the secreting organ is enclosed in an envelope or membrane, which does not readily yield to the distention thus occasioned.

60. *B. The Constitutional Symptoms.*—Asthenic inflammations derive their peculiar characters, local as well as general, from either pre-existing disorder or the poisonous nature of the exciting cause. The former consists chiefly of *debility*, as manifested in the assimilating, circulating, and excreting functions (see Debility, § 13, *et seq.*). The vital powers are impaired throughout the frame, and especially in the organs of digestion, circulation, and depuration. Hence, with increased sensibility and susceptibility of the nervous system, the blood soon becomes affected, and is less suited for the production of a healthy secretion, and for the formation of coagulable lymph or albumen in the seat of inflammation, than in persons otherwise circumstanced. When asthenic inflammation depends upon the exciting causes, it will generally be found that they possess poisonous or contaminating properties which infect the frame, while they produce inflammatory action in certain structures by their specific operation, as in the infection of erysipelas; or which contaminate the system by acting directly upon the part with which they come in contact, as when a septic animal fluid or an animal poison is applied to a wounded or abraded surface. Very frequently asthenic inflammations derive their constitutional as well as their local peculiarities from both these sources; from the previous state of health as well as from the nature of the exciting cause. In surgical practice, they not infrequently depend upon the severity of the shock sustained by the system in cases of very severe local injury, as in extensive bruises and crushing wounds, or after operations. In all cases of asthenic inflammation, although the states of constitutional or vital power and of the circulating fluid are chiefly concerned in modifying the character of the local disease, yet the local generally reacts upon the general affection, the one aggravating the other reciprocally and progressively, until either a fatal disorganization or arrest of function takes place, or a favourable change is brought about by energetic means. This is evinced especially in the diffusive visceral inflammations occurring in diseased or cachectic habits of body, or in the course of continued fevers, and in certain forms of erysipelas, and of inflammation of the cellular tissue

61. The severity of the constitutional symptoms frequently has but little apparent relation to the extent of the local inflammation, the latter being comparatively slight, and presenting but little of the spreading, diffusive, or disorganizing characters usually observed in connexion with remarkable febrile commotion and vital depression. A person may experience a slight abrasion or puncture of the integuments, followed by inflammation to no great extent, with a more or less foul discharge, or with a discharge not materially different from that following sthenic inflammation; and yet the constitutional affection may be of the most violent description, and characterized by excessive vascular action, by great excitement and morbid sensibility of the nervous system, and by remarkable depression of nervous power and of vital resistance. It is this state of disease especially which Mr. Travers has so well described under the terms *Direct and Reflected Constitutional Irritation*—terms which, in the

present state of our knowledge, convey as satisfactory an idea of the nature of these causes as any other that can be employed. The remarkable constitutional disturbance characterizing them has been ascribed to sympathy; and probably it may be produced in some instances by the absorption of a morbid or poisonous secretion or fluid into the circulation; but the majority, and these the most severe and the most marked, as to all the peculiarities of these maladies, can be ascribed only to a morbid impression or lesion of the organic nervous system that is soon propagated throughout the frame, implicating, not only the vascular system, but also the cerebro-spinal functions and all the vital manifestations. So intense a disease, produced by so slight a cause, and depending, apparently, upon so small a local lesion, is, it is true, very inadequately explained by the terms *irritative fever* and *constitutional irritation*, and far less by that of *constitutional sympathy*; but the difficulty is, to denominate them by any other name which shall be in every respect appropriate.

62. The constitutional symptoms attending upon asthenic, foul, or spreading inflammations appear variously grouped or characterized; but they may be referred chiefly to the following types or varieties: 1st. General and remarkable depression of organic nervous or vital power, without vascular reaction; 2d. General depression of vital power, with vascular reaction or excitement; 3d. Vital depression, with acute nervous sensibility and cerebral disorder; and, 4th. Vital depression, with remarkable nervous excitement and vascular reaction. Although the constitutional commotion usually appears in one or other of these forms, yet it must be admitted that the arrangement is somewhat conventional; that there are often intermediate or mixed states of disturbance; and that the general affection may commence in either of these forms and pass into another, owing to the influences to which the patient is subjected in its course. Nay, fever attending sthenic or adhesive inflammation may be converted into either of these low types of fever by the more powerful depressing or contaminating influences; and the latter may be changed into the former by agents of an opposite nature, similar alterations taking place, from the same causes, in the characters, consequences, and terminations of the local affection.

63. *a. General vital depression, without reaction*, is not of frequent occurrence, and is produced only by a very sedative or poisonous cause, relatively to the power of vital resistance, when depending upon a slight local lesion. It is very frequently observed after severe shocks, crushing injuries, and operations. However induced, it usually commences with a sense of general coldness, sinking, anxiety at the epigastrium, nausea, occasional vomiting, and remarkable despondency or depression of spirits. The skin is of the natural or of a diminished temperature, and there is generally little or no thirst. The mental faculties become obscured or stupified, and the countenance collapsed; and convulsive motions or twitches frequently occur. The pulse is weak, irregular, small, or compressible; sometimes quick or intermittent, but always deficient in power. Vomiting is often attended by little retching, matters being brought up with a species of singultus; and the alvine excretions are always morbid and offensive. As the powers of life sink, low delirium, coma, the supine posture, hiccough, complete physical prostration, sharpened features, and a cold, clammy state of the surface supervene; the local disease either becoming more deeply discoloured or extending towards the centre of the body, or passing into gangrenous disorganization.

64. *b. Vital depression, with general vascular excitement and reaction*, is much more common than the preceding variety of constitutional affection. It is generally ushered in by chills or rigours—sometimes with nausea, and even vomiting. The skin soon becomes hot, dry, burning, or harsh; but occasionally the affected part is hot and burning, while the temperature of the surface is very little elevated. The pulse is generally above 110°, and sometimes it is 120°, or even upward; it is compressible, open, broad, quick, and irritable, becoming more so, and smaller or weaker, as the disease proceeds. The tongue is foul or loaded, sometimes glossy, and afterward dry and mahogany coloured. The evacuations are offensive and otherwise disordered. Medicines, or substances taken into the stomach, are soon thrown off; and there is generally thirst, which is at first urgent, but becomes less so, and is at last not complained of, particularly when delirium takes place. Delirium first appears at night, and either remits in the morning or continues, and is often followed by coma. In some instances the vascular excitement is most rapidly developed, or reaction speedily follows the rigours, and all the symptoms soon become severe; violent headache, with anxious, collapsed countenance, succeeded by delirium, appearing early. In other cases the general excitement is more slowly and more moderately produced, and not until several rigours and attempts at reaction have taken place. In either case exhaustion speedily occurs, and all the symptoms of the advanced stage of the preceding variety supervene. The disease is rapid in its progress, if it be not early arrested by treatment; and the local alteration extends more or less, assumes a more livid or dark hue, or more aggravated form, or becomes more disorganized. When pus has been formed at an early stage of the local affection, and is confined in deep-seated parts, or beneath fasciæ, it is often offensive, discoloured, and different from that discharged after sthenic inflammation. In many instances the local alteration is apparently slight in relation to the severity of the constitutional affection; but in others it has extended to a very considerable distance along the absorbents, veins, or cellular tissues from its primary seat, and has thus either been overlooked or has infected the blood. (See articles Cellular Tissue—*Diffusive Inflammation of*; Erysipelas; Lymphatics, and Veins.)

65. *c. Vital depression, with acute nervous sensibility and cerebral disorder*, is very often observed to accompany asthenic inflammations caused by animal poisons and septic animal secretions, especially by the inoculation of either of them during the dissection of dead bodies. In all these the pain felt in the seat of injury is most excruciating, and is attended by general irritability and impatience; by irregular

chills, loss of appetite, intense headache, white tongue, thirst, anxious countenance, nausea, and sometimes vomiting; a frequent, small, quick, or irritable pulse; hot and dry skin; sleeplessness, followed by delirium; and, lastly, a dry, brown state of the tongue; vomiting, singultus, coma, subsultus tendinum, collapsed features, cold, clammy perspirations, and quick, laborious respiration. The febrile commotion often commences insidiously, and without rigours or chills, and proceeds with much rapidity. In this variety, particularly when produced by the causes just stated, morbid sensibility, general irritability, violent headache, and want of sleep, early delirium, and suppressed, imperfect, or weak vascular reaction, are characteristic phenomena, the other symptoms being less constant. The local alterations generally consist of early and remarkably intense pain, excessive and spreading tumefaction, and of purulent formations, first on the seat of injury, but extending, successively, to parts nearer to the centre of the body, until the trunk and large cavities are reached. The cellular tissue, in the course of veins and absorbents, or around the glands of the latter, is most commonly attacked; and, ultimately, the serous envelopes on internal organs, or even these organs themselves, occasionally become implicated; but other parts, particularly the lymphatics, fasciæ, and veins, are often also affected.

66. *d. Vital depression, excessive irritability, violent pain, and vascular excitement* often attend cases of asthenic inflammation, arising from similar causes to those inducing either of the former varieties of constitutional commotion; the difference in the degree of vital depression in the one, of nervous disorder in the other, and of vascular excitement in a third, depending chiefly upon the temperament, habit of body, vital power, age, and previous health of the individual, and upon the nature of the exciting cause. In proportion as the cause is of a poisonous, depressing, septic, or contaminating nature, relatively to nervous susceptibility and vascular activity, will the local affection be diffusive, spreading, or disorganizing, and the constitutional disturbance be characterized by a predominance of the symptoms marking excessive vital depression, or acute nervous suffering, or tumultuous vascular excitement, devoid of the power of resistance. When the impression of the cause, or the subsequent influence of the local disease, depresses the vital energies beyond recovery, or the power of reaction, the extension of disorganization and the sinking of the manifestations of life throughout the economy are remarkably prominent. Where either the cause or the local disease is less overwhelming, relatively to the state of constitutional power, reaction takes place, and efforts are thereby made to resist the progress of the local and general mischief. Violent pain and other severe nervous symptoms, whether occasioned by the nature of the exciting cause or depending upon the state of the system, may attend any of the varieties of constitutional affection, either that of continued depression or that of vascular reaction. Where the nervous sufferings are extreme, the vascular system usually evinces some degree of excitement; but it is often slight and without power. In certain cases the reaction is as excessive as that marking the second variety of constitutional affection (§ 63), is accompanied with the same symptoms, and runs a similar course, the only difference being in the greater affection of the nervous system than in it. In other cases vascular excitement is not sensibly raised, unless in so far as the great rapidity of the pulse may indicate it, as in the third variety (§ 65). In either case the cerebral disturbance is great, and the disease tends rapidly to an unfavourable issue, if not arrested by active means.

67. If *blood* be taken in any of the varieties of asthenic inflammation, it either does not coagulate, assuming a treacly appearance, or it coagulates imperfectly, the crassamentum being loose; or the imperfect coagulum consists, in its upper half, of a mass resembling jelly in colour and consistence, the lower half containing the colouring matter. The blood, however, may present other appearances, particularly those already noticed, and those described in the article Blood (§ 110, *et seq.*). Venæsection, in these states of disease, is generally prejudicial, although, in some of the cases, where the vascular reaction is great, local depletions are often serviceable by unloading the distended capillaries, and diminishing local tension.

68. ii. Progress and Duration. — *A.* The *course* of asthenic inflammations is usually acute; and, unless controlled by salutary agents, is generally to an unfavourable termination. While these inflammations most frequently originate in causes which are septic or poisonous, and depressing relatively to the power of the constitution, they also sometimes follow the more sthenic forms of morbid vascular action, in consequence either of the exhaustion following excessive reaction, or of the operation of sedative influences or contaminating agents. Hence, persons affected with sthenic inflammation, especially of a part exposed to the air, will have it changed to the asthenic form, soon after removal to the crowded wards of an hospital, or to any impure or unhealthy situation; and a similar change will also occur in visceral or internal inflammations, from any depressing influence, moral or physical. On the other hand, *asthenic* inflammations are often converted into the *sthenic*, by restorative means acting upon either the respiratory or the digestive functions. Indeed, the principal indication of cure in the former is to change them to the latter by such means; but, in order that this end should be accomplished, they must be energetically and appropriately employed. Repeated efforts at restoration, in respect both of the local lesion and the constitutional disturbance, are often made during the course of asthenic inflammation, especially when the treatment is only partially calculated to attain its objects; and the disease thus assumes a remittent appearance, and is much prolonged. When a morbid secretion, or fœtid pus, collects in a part which is deep-seated, although a favourable change may seem to have taken place from the treatment, all the symptoms, local and constitutional, are sometimes speedily and unexpectedly aggravated, and the patient ultimately sinks. Occasionally, efforts at restoration recur oftener than once, before either recovery takes place or death ensues. This is especially the case when the disease is caused by the inoculation of an animal secretion or poison; the

inflammation extending along the cellular tissue, lymphatics, or veins, sometimes with occasional interruptions to its course, and with short ameliorations of the nervous and general disturbance, until the trunk of the body is reached, when all the symptoms become suddenly aggravated: vomiting, delirium, lurid and collapsed countenance, exhaustion of vascular and nervous power, laboured respiration, clammy perspiration, singultus, &c., appear, and the patient sinks. Upon *dissection*, collections of fœtid pus, disorganization of the cellular tissue, and lesions of the lymphatic and circulating vessels are found extending to the central parts of the frame. The neighbouring cavities also contain effused fluid of various appearances, and the parenchymatous viscera purulent collections, the serous membranes being more or less inflamed, or partially adherent.

69. *B.* The *duration* of asthenic inflammations varies from a day or two to several weeks. It may not be longer than the former period in the puerperal state, and it may be prolonged to the latter in the recurring or remitting form of the disease. It is also often of very short duration, when caused by septic or contaminating animal matters. In many cases, however, when the spreading characters of the local disease, and the adynamic type of the symptomatic fever have been arrested, a suppurative state of action continues for a considerable time, until more or less complete reparation of the affected part is accomplished. Indeed, this is generally the case when much disorganization has taken place before the disease is arrested.

70. iii. Complications.—Asthenic inflammations frequently occur in the course of other diseases, particularly of exanthematic, continued, and adynamic fevers. It is chiefly when exanthematic fevers assume an adynamic form that the inflammations which complicate them are truly asthenic. In the inflammatory type of these fevers, the associated local alterations possess more of the sthenic characters. The same applies to continued fevers, the adynamic species being those in which the asthenic states of local action and of structural change are chiefly observed. Indeed, asthenic inflammations frequently appear in the course, and even constitute a principal part of all infectious, malignant, and contagious maladies. In these, they present, generally, modified or aggravated characters; but still they are merely varieties of this state of local morbid action, depending upon the specific nature of the cause, and of the constitutional affection. This is exemplified by scarlatina, smallpox, plague, &c. The course of most of these specific forms of asthenic inflammation is very acute, the complication often accelerating a fatal issue.

71. iv. Terminations and Consequences.—*A.* Asthenic inflammations *terminate*, 1st, in a return to a healthy state of action; 2dly, in sphacelation or disorganization; and, 3dly, in dissolution without sphacelation, or without disorganization so extensive as to be of itself productive of death.—*a. A return of the healthy state* of action is generally brought about by constitutional or local means—by the former especially, or by both—which are calculated to restore the vital powers, to impart tone to the relaxed capillaries and tissues, and to enable the part to secrete a more healthy pus, and to form coagulable lymph, by which the extension of the morbid action may be prevented. Thus it is necessary that the asthenic state should be changed into the sthenic before restoration can be accomplished; and this can be affected only by such means as will change the constitutional commotion from the adynamic type, as will give energy to the organic nervous system, at the same time that they restrain excessive vascular action. As soon as the local disease and accompanying fever assume the sthenic conditions, reparation commences, and recovery takes place, as in these inflammations (§ 39).

72. *b. Sphacelation* or *disorganization* of the affected part may take place in very various grades. After the occurrence of either, the inflammation and disorganization may cease to extend; the local action and febrile commotion may gradually or quickly assume a more sthenic character, particularly under restorative influences; the sphacelated portion may be thrown off, the disorganized part repaired, a suppurative action set up, and coagulable lymph thrown out around the seat of suppuration, whereby the surrounding structures will be protected, and the diseased parts more or less restored. Very frequently, however, when asthenic inflammations terminate in this way, the local mischief increases rapidly, and the general disturbance is aggravated, until life is at last extinguished. In these cases, the destruction of parts, either by sphacelation, or by phagedenic or sloughing ulceration, is generally so extensive as to be incompatible with the continuance of life; but in those next to be noticed the destruction of parts is not of itself sufficient to produce death.

73. *c. Dissolution, without sphacelation, or disorganization*, so extensive as to account for the occurrence, is not an infrequent termination of asthenic inflammations. In such cases, the local affection is either merely the local manifestation of a severe constitutional malady, or is attended by a state of vital depression or exhaustion so extreme as to terminate life before it had advanced to the changes constituting actual disorganization. In some of these cases the result depends chiefly upon the morbid impression first made upon, and continuing to influence the organic nervous energy, and in others it is partly owing to the morbid state of the blood, arising either from the same source, or from contingent circumstances or changes. When serous or mucous membranes are the seat of asthenic inflammation, a fatal termination is owing rather to the vital depression consequent upon the extent of surface to which the morbid action has been extended than to the amount of disorganization. This is evinced in many cases of general *peritonitis*. When a mucous surface, engaged in the performance of vital actions, is the seat of the disease, the powers of life often sink rapidly, both from the extent of surface affected, and from the interruption to the functions performed by it. This is shown in general *bronchitis*, and in certain states of *influenza*. Illustrations, moreover, of this termination of asthenic inflammations are often furnished by certain of the forms of disease caused by poisoned wounds, or by local injuries, and by some cases of *puerperal disease*,

and even of *erysipelas*,* particularly when occurring in an infectious or epidemic form.

74. *B. Consequences.* — Asthenic inflammations give rise to certain changes which differ, in some respects, from those attending the sthenic form of the disease. It is necessary, in practice, to be fully acquainted with the differences between the results of both states of inflammation, especially as they are often so slight as to be overlooked, and as these results are generally essentially the same, but modified in character and in the period of their appearance. — *a. Effusion* of serous fluid is a very early consequence of asthenic inflammations. In parenchymatous or cellular parts it produces the extreme swelling (which is, in some cases and situations, œdematous or quaggy) attending the disease; and, in serous membranes, it often takes place to a great extent, and is in all respects an *effusion* rather than an *exudation*. The appearance of the effused fluid varies much with the state of the disease, and with the degree of vital power and vascular reaction. In proportion as power is depressed is the effused fluid ichorous, foul, abundant, and dark or discoloured; probably from some of the blood globules, or of the colouring matter, having been effused with the serum. Hence it is, in some instances, almost sanguineous. As vascular reaction is increased, the fluid is turbid, flocculent, sero-albuminous, or sero-puriform, the situation and other circumstances attending upon the effusion modifying its character. The puerperal state, and the persistence or suppression of the discharges and secretions attending this state, modify remarkably the characters of the effused fluid, as in the asthenic peritonitis associated with adynamic puerperal fever. The fluid effused from the mucous surfaces is also much modified from that exuded during sthenic inflammatory action; it is usually less mucous and less albuminous, and more watery, serous, ichorous, or sero-sanguineous, as in cases of adynamic Dysentery (see § 26, 27). It is sometimes glairy as well as watery; and when vital power is extremely depressed, it is very dark-coloured, offensive, and sanious. When sthenic inflammation passes into the asthenic state, owing to failure of the powers of life, or to morbid states of the blood, the effused fluids also pass from a consistent and coagulable to a fluid and ichorous state. The fluid effused during asthenic inflammation of cellular parts also partakes more or less of the characters just mentioned. It is deficient in albumen or coagulable lymph, and hence more readily infiltrates the surrounding tissues; and when it is of an ichorous nature it seems to contaminate the parts to which it extends. Thus, asthenic inflammation of cellular tissues is never limited by the effusion of coagulable lymph, unless a change be produced in the general and local disease by means hereafter to be pointed out; and then lymph is formed around the seat of morbid action, agglutinating the areolæ of the tissue, and becoming a barrier between the morbid matters effused in the central diseased parts and the healthy structure.

75. *b. Softening* is the next early consequence of asthenic inflammation, and one of the most remarkable. It is evidently owing to the extreme prostration of vital power in the part, causing a loss of the vital cohesion of the tissues, progressive with the disease. I have seen the softening so extreme that the structures have been torn with the utmost ease after death, although the examination was made while the body was still warm. When this state of morbid action affects cellular and mucous parts, the softening and want of cohesion are equal to that of wet bibulous paper. They are often also very remarkable when the serous membranes have been implicated. In some cases of infectious puerperal fevers, complicated with asthenic peritonitis and hysteritis, I have found the peritoneum, and even the substances of the uterus, not only discoloured, but so softened as to be torn with the utmost ease.

76. *c. Suppuration* of a truly restorative nature is met with chiefly when the morbid action verges towards the sthenic type. Purulent matter is frequently found in parts asthenically inflamed, and is often secreted from surfaces thus affected; but it is generally offensive, and otherwise modified from that described above (§ 47). It is often tinged, particularly in cellular and mucous parts, with the colouring substance of the blood. As the puriform matter secreted by this state of action is not confined from the adjoining structures by the effusion of coagulating lymph, and by the cysts thereby formed, it is frequently partially absorbed into the circulation. It thus contaminates the blood, and aggravates both the constitutional and the local disease, rendering still more morbid the secretions and excretions, as well as the discharge from the seat of inflammation. When the matter passes to a more perfect pus, the change depends upon an improvement in the local and general action, and is an indication of commencing restoration, if unfavourable influences do not come into operation. Mucous and serous membranes often secrete a puriform fluid, presenting characters varying with the states of vital power and of vascular action, when asthenically inflamed, and generally in a very large quantity. The asthenic bronchitis attending severe cases of *influenza* generally give rise to a copious secretion of a thin muco-puriform fluid; and the effusions into shut cavities, in some cases of complicated erysipelas, of puerperal fever, &c., consist of a sero-puriform matter, occasionally tinged with blood, or otherwise modified.

77. *d. Ulceration* from asthenic inflammation is characterized by a rapid loss of substance, and its consequent extension. The edges and bottom of the ulcers are softened; sometimes not materially, if at all, elevated; and occasionally not much discoloured, or even inflamed. In other instances they are foul, dark, phagedenic, or sloughing. The discharge from the ulcers is usually ichorous, sanious, sometimes slimy and watery, and always offensive. The loss of substance is in them more owing to deprivation of the vital cohesion of the tissues at the diseased surface, and to the liquefaction or admixture of the dead molecules in

* In 1836, erysipelas prevailed most generally and fatally in the Orkney Islands. Its infectious nature was fully demonstrated on many occasions. It assumed a low or adynamic form, and the deaths from it were more numerous, for the period of its continuance, than from any other disease that had prevailed within the memory of the oldest practitioner.

the fluid discharge, than to absorption, which, however, takes place to some extent. When the ulceration is sloughy or gangrenous, and the discharge copious and very offensive, it is chiefly owing to the former. In some of these cases the loss of vital power and cohesion is much more rapid than the solution of the molecules in the discharge, and then large sloughs cover the ulcerated parts. In some instances the sloughy appearance proceeds from the more consistent or albuminous portion of the discharge having attached itself to the surface, while the fluid part either is dissipated by evaporation, or has passed off. This, however, is observed chiefly when a change to a more sthenic action takes place in the inflamed tissues. When absorption proceeds rapidly on the ulcerated surface the constitutional symptoms are thereby greatly aggravated, and an unfavourable termination accelerated. Asthenic inflammations of the mucous surface, and particularly of that of the bowels, are often followed by ulceration, which occasionally presents a sloughing or phagedenic appearance. (See Dysentery, § 54, 56.)

[When the inflammation is of a low character, or when the blood is poor in red particles, and especially when these two conditions are combined, the solid products of inflammation are less capable of organization, and therefore may be called *cacoplastic*. As the process of organization varies in degree, so these products may attain to different degrees of structure, forming membranes of a denser, less pliant texture, and less vascular than the serous membranes to which they are attached, and which they therefore shackle. Thus, patches of a kind of fibro-cellular or fibro-cartilaginous membrane are formed on the lungs, the heart, and the intestines, sometimes with the effect of materially impeding the functions of these several organs. Where the effusion of lymph is scanty and slow, its granular mode of deposite is more obvious than in the more acute disease; for, being less ductile, it is less readily spread or stretched by the motion of the parts. This is well seen in chronic inflammations of the peritoneum and arachnoid, in which the deposite is almost entirely in granules or flattened patches, commonly called tubercles. These are generally of a buff or skin colour, of firm consistence, and sometimes exhibit slight traces of blood-vessels in them; but sometimes their colour is more yellow and opaque, their texture uniform and tough, and they are totally destitute of vascularity. These constitute the formations described under the names cirrhosis and crude yellow tubercle, and are the lowest of the organized products. Being, in organization and consistency, dissimilar to the membranes on which they are formed, they prove a source of irritation and constriction; and, being liable to ulterior changes (shrinking and contraction in the case of cirrhosis, farther degeneration and softening in the case of yellow tubercle), they may bring farther mischief in contiguous parts.

In some cases, again, more or less of the product of inflammation is *aplastic*, or totally incapable of organization, and is thrown off with the liquid in separate large globules filled with granules and molecules, constituting pus, or in detached flakes or curds, consisting of aggregations of irregular opaque corpuscles and molecules held together by a few fragments of fibrils: such effusions are exemplified in the sero-purulent liquid and curdy matter of low pleurisy, pericarditis, and peritonitis. It is obvious that such lifeless products must act prejudicially on the containing structures, and the fact might be anticipated that they are little susceptible of absorption.

I have mentioned a low form of inflammation, and an unhealthy condition of the blood, as causing the cacoplastic character of the products of inflammation. It may be added, that the long continuance of any inflammation, and its occurrence in subjects in whose blood fibrin abounds, while the red particles are scanty, will pretty surely render the products cacoplastic or aplastic. At the onset of inflammation its products may be plastic, and the process of vascular organization may commence; but if the inflammation continues, its product either is thrown beyond the reach of vascular communication or displaces that already effused, and thus the outer layer will be in a degenerating condition. Added to this, the pressure of the liquid effusion may impede the construction and injection of the new membrane, which, therefore, is degraded into one of the cacoplastic or aplastic matters above described. Again, in scrofulous or cachectic subjects, the blood, although scanty in red particles, abounds in fibrin, and this is readily effused in inflammation; but is of low vitality, and susceptible of little or no organization. There is yet another circumstance tending to lower the plasticity of lymph (although, from the observation of Mr. Dalrymple, it sometimes accelerates its organization), that is, the admixture of the colouring matter of the blood with it. Laennec supposed that contraction of the chest had its origin in hæmorrhagic pleurisy only. This is not correct; but I have many times remarked, after death, that lymph on the pleura and pericardium, in cachectic subjects, is much stained with blood; and where patients with similar symptoms have recovered from inflammation, they have been affected with structural disease. So far as we yet know, the colouring matter does not form a material for organization; and, farther, it is very probable that in such cases the colouring matter is itself diseased.]—*Select Medical Library*, p. 252.

78. III. Modification of Inflammation by Structure.—Inflammation has been considered above chiefly with reference to vital power and vascular action, without, however, overlooking the modifications depending upon structure. On this latter part of the subject a very few general remarks may yet be added. Dr. C. Smyth first ascribed the differences of inflammation to differences of tissue; and the writings of Bichat, Pinel, Beclard, Gendrin, and others have tended to give very general currency to these views, and to carry them much beyond their legitimate value. Structure certainly modifies, not only the course and terminations, but also the results or products of inflammation; but still the chief sources of difference are the states of vital power and of vascular action. Besides, inflammation of an organ or part is not limited to a single constituent tissue of that organ, although it may have

originated in one tissue only. It usually implicates two or more, although the cellular tissue, being, as it were, the matrix of the rest, is that chiefly affected. When inflammation thus extends to different textures, its characters, terminations, and consequences are modified more by the vital conditions above insisted upon than by differences of structure; and, even when very differently organized parts are affected, the consequences of the morbid action in all of them are often very nearly the same, and are obviously owing chiefly to the states of vital power and vascular action. Even when mucous or serous surfaces are inflamed, the morbid action is seldom confined to them, the connecting cellular tissue being more or less implicated, and frequently also the adjoining structures; but the results and terminations of this action chiefly depend upon the constitutional affection; or, rather, the local and the general disease are both consequences merely of the morbid states to which they have been just ascribed, and are hence more intimately dependant upon them than upon other circumstances. In the present day, so much has been imputed to structure and to its modifications, natural and morbid; the alterations of function, of sensibility, and of action have been so generally connected with lesions of organization, both by teachers and writers, as to mislead those who are seldom at the trouble of thinking for themselves or of attending to the suggestions of common sense in medical observation and reasoning. Organization, function, and disease are so frequently viewed in connexion, and function is so generally considered as resulting from structure, and disease from alterations of structure, that the principle which not only endows, and regulates, and controls, and ultimately arrests the functions, but also alters the whole organization, is left out of the question; and the results of observation in respect to its various conditions and agencies—the circumstances which modify these conditions, and which change its manifestations in the various organs, either from healthy to morbid states, or from the latter to the former—are either insufficiently appreciated or entirely neglected. Too much is ascribed to the material and gross effects, while the conditions out of which they arise are kept out of view, in respect both of their primary operation and of their continued influence. It is unnecessary to add anything to what is advanced on the modifications of inflammation by structure in the various articles where the pathology of the different tissues and organs is fully discussed.

79. IV. Diagnosis.—*Inflammation may exist in internal parts without being evinced by the usual local and general symptoms; and the parts affected by it during life may present very few, or even no indications of it after death*, while *some affections closely resemble inflammation, and certain appearances very nearly approach those produced by it in the tissues.* To each of these points the *diagnosis of inflammations in general* has especial reference.

80. *A.* Inflammation may be so *latent*, or so *obscure*, owing to the absence of the most important symptoms, and to its seat, as to be recognised with great difficulty. The more slight and chronic forms of inflammation are those most frequently latent or concealed; yet the most acute states, especially of an asthenic form, and occurring in states of the system characterized by impaired sensibility, or in viscera whose organic sensibility is naturally low, are often latent or obscure. These *concealed inflammations* have been noticed by Hoffmann, Baglivi, Stoll, Weinholt, Mayer, Meckel, Reyland, and Hartmann, and been frequently observed in certain epidemics. They are more common in some organs than in others, especially in the course of adynamic and typhoid fevers, and in other complications. Although they may be expected to exist chiefly, if not altogether, in parenchymatous structures, where the organic sensibility is the most obscure, yet they are not infrequent in serous and serofibrous tissues, which are usually acutely sensible in the inflamed state. A morbid condition of the blood, as well as a generally impaired state of sensibility, seems to diminish sensibility in inflamed organs; for the *consecutive* or *secondary inflammations*, which proceed from pre-existing inflammation or disease, are commonly latent or concealed.—*a.* Epidemic fevers are very frequently complicated with acute asthenic inflammations, which seldom betray themselves during life, owing both to the depressed state of organic sensibility and to the condition of the blood. The brain, the lungs, the liver, the kidneys, the digestive and the respiratory mucous surfaces are the most liable to be thus affected, without indicating, upon the strictest examination, the extent of mischief, even auscultation, percussion, and pressure often failing in furnishing the usual evidence of it. Inflammations, however, of the respiratory organs would much more frequently be concealed if these means of investigation were not resorted to. Indeed, in fever, in influenza, and in various epidemics, pneumonia would almost always be concealed without these aids. Inflammation of the abdominal viscera, during these and other maladies, often, also, does not become manifest, unless upon the strictest examination of the stools, the urine, and the patient's position in bed, and upon the closest observation of the effects of pressure, &c.

81. *b.* Inflammations of serous and serofibrous structures are not infrequently latent, especially when they commence gradually and proceed slowly, or when they appear under the same circumstances as have just been mentioned. Pleuritis and pericarditis, in chronic forms, and as complications of febrile or epidemic maladies, are often concealed; and, although less frequently so when auscultation and percussion are employed, yet they often escape detection, especially when they give rise to little effusion, until disclosed by examination after death. The same is observed, although much less frequently, with respect to peritonitis, which, however, often supervenes in more or less obscured states in the course of adynamic fevers.—*c.* Concealed or obscure inflammation of mucous surfaces, especially of the digestive, is remarkably common. Many of the disorders attributed to disturbed function merely are actually slighter states of inflammation. But much more severe, and even acute forms of the disease may exist in this tissue without the usual evidence of them

having been furnished, and may run on to disorganization, and even to death. This, however, chiefly occurs in the course of continued fevers, and in the other circumstances just mentioned.

82. *B.* Various *febrile diseases*, and *painful* and *spasmodic affections*, so closely resemble inflammations as to be distinguished from them with difficulty.—*a.* Several internal inflammations are liable to be mistaken for the more *sthenic forms of continued fever*; and that is the more likely to occur when the latter become complicated, particularly at an early period of their course. But internal inflammations, especially those of a sthenic character, present, among the earliest phenomena, some, at least, of the principal symptoms of inflammation, even before the chills or rigours take place which usually attend their development. The disease is strictly local from the commencement, and is not attended by the vital depression and loss of muscular power, which not only accompany, but also precede idiopathic fever. In the former the fever is sympathetic of and contingent upon the local affection; in the latter the inflammatory complication is a contingency or accident, arising either soon after the commencement or in the course of the constitutional malady.

83. *b. Painful affections* of internal or concealed parts are liable to be mistaken for inflammation. But violent pain is not always an attendant upon inflammatory action; and, unless in very acute cases of pleuritis and peritonitis, the pain of inflammation is seldom so severe as that which is dependant solely upon nervous disorder. It is only when the pain is attended by increased vascular action and heat of skin; by symptomatic fever, or, at least, by some degree of vascular excitement; by heat or tension in the vicinity of the pained part; and by a white, loaded, furred, or excited state of the tongue, and high-coloured urine, and when it is increased by pressure, that it becomes an indication of inflammation. The pain of nervous disorder is intermittent or remittent; it often suddenly ceases for an indefinite time, and as suddenly reappears. It is not attended by a sense of burning, or of heat, or of throbbing, and it is generally eased by firm pressure; whereas the pain of inflammation, when severe, becomes gradually so, is continued, although often exacerbated at times, is frequently throbbing, and is always associated with very marked disturbance of the functions of the pained part.

84. *c. Spasmodic disorders* are often referred to inflammatory action; and about twenty-five years ago, when blood-letting was the alleged cure for everything, and for these disorders especially, they were firmly believed to proceed from this source. However, like painful affections, they are more frequently purely nervous, or independent of inflammation. It is true that they may be complicated with one or other of its forms, and that either painful or spasmodic affections may proceed from congestion, or active determination of blood to the organs thus affected, or to parts in their vicinity; but still these are not inflammation. Both classes of disorder most frequently proceed from some unnatural excitement or irritation at the origin, or in the course either of the nerves supplying the painful or convulsed part, or of those connected with them. Thus, irritation of the intestinal or uterine nerves will produce pain or spasm, or both, in remote parts, by their *direct* and *reflex sympathy*; and the irritation of calculi in the kidneys will occasion colic by the *direct sympathy* of the ganglial nerves, and pain or spasm of distant voluntary parts by the *reflex sympathy* of the cerebro-spinal nerves. (See *Direct and Reflex Sympathy*, in my edition of RICHERAND'S *Elements of Physiology*, edit. 1824 and 1829, p. 546.)

85. *d. Determination of blood* to particular organs may also be confounded with inflammation; and it may run on to the more sthenic forms of the disease, either in acute or in chronic states; but care should be taken to distinguish between them. I have, in the article BLOOD (§ 25), entered fully upon the consideration of *local determination of blood*, and upon the differences between this affection and *inflammation*; and have shown that while the *first* of these consists only of augmented circulation and functions of a part, and is unattended by symptomatic fever, or any other alteration, the *second* is an actively morbid state of the organic nervous influence, and of the vessels of a part, accompanied by symptomatic fever, and tending generally to change of structure, and often to disorganization. In the *former* the functions are usually increased, or inordinately excited, the organic sensibility being either unaffected, or not easily excited; in the *latter* the functions are rarely increased, but always much deranged, or entirely suppressed, organic sensibility being early excited or disordered, and generally sensibly disturbed. (See art. BLOOD, § 25–33.)

86. *e. Congestion of blood* in one or more organs has also been mistaken for inflammation, both during the life of the patient and in examinations after death. In the article CONGESTION, I have defined it to be deficient vital tone or power, chiefly of the veins of an organ or part, occasioning accumulation of blood in them, and a languid or retarded circulation, the functions of the organ being thereby proportionately disordered. The pathological relations, terminations, appearances, and symptoms of this form of disorder are there so fully described that it is unnecessary to notice, at this place, the distinctions between it and inflammation, farther than that, in the *former*, the functions of a part are generally more or less impaired, without the organic sensibility being morbidly excited, and without symptomatic fever being present; in the *latter* there is not only disturbance of functions, but also exalted or disordered sensibility and vascular action, and more or less febrile commotion. The one is a morbid state of the capillaries and arteries, originating in the organic nervous influence of a part, with which state the system generally sympathizes; the other is an engorgement of the veins, sometimes extending to the capillaries, owing either to a mechanical obstruction to the return of blood through the former, or to deficient vital energy of the affected organ. The blood in congested capillaries and veins is of a purple or black hue, while that in the capillaries of inflamed parts is much more red or florid. (See art. CONGESTION OF BLOOD.)

87. *C.* There are *certain appearances observed*

after death, which are often difficult to be distinguished from those consequent upon inflammation.—*a.* The *congestion of blood* from mechanical obstacles to the circulation in the veins will not be mistaken for inflammation, if the exact state of the congested tissues, and if the course of the venous trunks be carefully observed. It is in mucous membranes especially that the diagnosis is at all difficult, and in them only when the redness presents a ramiform appearance. In congestion from this cause the veins are full, often tortuous, and rarely varicose, states not existing in inflammation; and the obstruction is commonly organic disease of the liver, or of the heart, or of the lungs, or the pressure of some tumour on large veins. Mechanical congestion sometimes, however, gives rise to inflammation, or is associated with it, and then the difficulty of diagnosis is much increased; but the state of the tissues, the capillaries of which are thus congested, and the presence of one or other of the usual consequences of inflammation will generally lead to a correct conclusion. Dr. Macartney mentions, in his work on *Inflammation*, which appeared as this article was passing through the press, that the arteries of a congested part are smaller than natural, and that he verified the fact by experiments; the corresponding arteries to the veins, which were congested by tying them, being very much reduced in size.

88. *b. Congestion from position or gravitation* is much more likely to be confounded with inflammation than that produced by mechanical obstacles; but attention to the relative situation of the congested part especially with reference to a depending position and gravitation of the fluids, will generally aid the observer. When congestion of the capillaries is present, where gravitation could not aid in causing it, and when there is no manifest mechanical obstruction of the veins, it must be ascribed to inflammatory action, although the usual consequences of such action are absent, for the inflammation may have been too recent to have given rise to them.

89. *c. Redness from imbibition*, or from the dyeing of the internal coats of vessels by the colouring matter of the blood, is sufficiently discussed in the article on *Diseases of* Arteries (§ 38). It is of a scarlet red, is limited to the lining membrane of the vessels, and is unconnected with any change in them, or with any capillary injection, or congestion of the vasa vasorum; whereas inflammatory redness in the internal surface of vessels is less uniform than it; is more dull or pink coloured; extends to all the coats, although in different degrees; and is accompanied with capillary injection, with softening and opacity of the inner membrane, with thickening, serous infiltration, &c., of all the tunics.

90. *d. Inflammation sometimes leaves no marks of its existence after death.*—This occurs chiefly in the inflammatory affections of the skin, and in slight or incipient inflammation of serous membranes. But the redness attendant upon the disease is more frequently diminished after death than altogether banished. The inflammatory redness of the skin, and mucous and serous membranes attending the exanthemata and continued fevers, often partially or wholly disappear after death; yet these structures present appearances which may be inferred to have resulted from inflammation, and to have been associated with redness and vascular injection during life, even although the fact had not been demonstrated to the senses. When the skin has been affected, it usually assumes a purplish hue in the seat of affection, and the cohesion of the cuticle to the subsequent tissue is early diminished, so that it soon may be detached with ease. The vital cohesion also of mucous and serous membranes is impaired more than is usually observed, although all redness has disappeared, and, in these parts, as well as in the skin and cellular tissue, decomposition makes a more rapid progress than in the healthy structures. Vascular injection and redness may have vanished more or less, even in situations, and in forms of inflammation where some one of the usual consequences of the disease is present. In this case, however, there can be no doubt of its nature.

91. V. Causes of Inflammations.—i. Constitutional and Predisposing Causes.—*a. Age* has considerable influence upon the production and progress of inflammation. The disposition, particularly to the more sthenic and acute forms of the disease, is greatest in childhood and youth. It may be said to diminish gradually from infancy to old age, while the more chronic and asthenic states become more frequent as age advances. The brain and membranes, the lungs and mucous surfaces, the skin, the serous surfaces within the thorax, and the glands are the most frequently affected in children and young persons; and the digestive, respiratory, urinary, and generative organs at more advanced epochs of existence, and generally in the order in which they are here enumerated.

92. *b. Sex* has but little influence in predisposing to inflammation. Males are more frequently affected, chiefly because they are exposed more than females to other predisposing and to many of the exciting causes. Females are most predisposed to inflammation at the commencement, during the continuance, and for some time after the disappearance of the catamenia, and during the puerperal states, especially after parturition.

93. *c.* Of *temperaments* and *diathesis*, the most influential are the sanguineo-melancholic and irritable; the scrofulous, gouty, and rheumatic. It is chiefly owing to the descent of temperament and diathesis to the offspring that inflammations sometimes present an *hereditary* tendency.

94. *d. Habits* and *modes of life* dispose to inflammations of various organs. Persons who are exposed to the open air and to atmospheric vicissitudes, or who take active exercise in the air, are liable to inflammation of the respiratory organs; and inflammatory diseases generally assume a sthenic or acute character in them. Those who are indolent, sedentary, or confined to warm or close apartments and unhealthy localities, are most subject to inflammations of the digestive, parenchymatous, and excreting viscera, particularly the excreting organs in the abdomen, the morbid action very frequently assuming either asthenic or chronic forms. The influence of *modes of life* in predisposing to and exciting inflammatory maladies is fully shown in the article on Arts and Employments.

95. *e. Food and drink.*—The liberal use of animal food favours the occurrence of every form of inflammatory action, or generates an inflammatory diathesis. It is even very probable that certain kinds of animal food predispose to morbid vascular action in some structures in preference to others. The frequent or habitual use of pork seems to dispose chiefly to inflammations of the glands, joints, and bowels, and aids in generating a scrofulous diathesis. The laws of Moses, with reference to animal food, have evidently had a salutary influence in rendering scrofulous, gouty, and inflammatory diseases less frequent among the Jews than in any other class of the community. In warm climates especially, the use of pork, and of the viscera and blood of animals, cannot fail of being prejudicial; and there cannot be a doubt that the proneness to inflammations among Europeans, in hot climates, arises chiefly from the quantity of animal food and exciting liquors consumed by them. Persons who live much upon fish are liable to inflammatory affections of the skin and digestive mucous surface; and, while flesh meats favour, in temperate climates, a sthenic form of inflammatory action, living much on fish disposes chiefly to the more asthenic and chronic states.

96. Exciting or *intoxicating beverages* predispose to, and often directly excite inflammation, particularly of the digestive and urinary organs. The habitual use of these liquors frequently induces and keeps up morbid vascular action, chiefly of these parts, of a sub-acute or chronic kind, generally passing into confirmed structural change. These effects most commonly follow the use of spirituous liquors; and, next to these, new wines and malt liquors are most prejudicial. Persons who use much of the former soon become subject to enlargements and obstructions of the abdominal viscera, consequent upon repeated or protracted inflammatory action; and those who drink the latter in large quantities, and who, at the same time, are very actively employed in the open air, as coal-heavers, draymen, &c., are liable to the most acute attacks, often attended by the most violent constitutional commotion, and terminating rapidly in disorganization of the inflamed part.

97. *f. A plethoric habit of body*—the more immediate consequence of diet and regimen—remarkably favours the occurrence of inflammations. Persons who live fully and take insufficient exercise are extremely prone to these diseases, when exposed to atmospheric vicissitudes, and to cold, particularly if the body is quiescent, as when a person is carried rapidly through the air in an open carriage. Persons in large towns or cities, accustomed to warm, close rooms, or engaged in sedentary occupations, and living fully, when called to a distance, often travel on the outside of coaches, or in open carriages, and are surprised when they are attacked by inflammations, the slighter forms and earlier stages of which they usually neglect: the surprise would have been if they had escaped. In the article Blood, where the subject of vascular plethora and determinations of blood are discussed (§ 13, *et seq.*), I have shown how much fulness of the vascular system disposes to inflammatory action, and how frequently the latter follows as a consequence, or as a higher grade of the former. When this system is overloaded, some part is liable to experience over-distention and augmented flux, which often soon passes into morbid action, the balance of circulation being readily disturbed by external and internal, by physical and mental causes. In the article referred to, I have stated the connexion often existing between congestions, general and local plethora, local determinations, and inflammations. Congestions and local plethora are frequently dependant upon the state of the venous circulation, and this upon obstructions in the liver, lungs, or heart; the efforts made to propel the blood in the capillaries, particularly under the influence of stimuli, readily inducing inflammation, especially of an asthenic kind. These states of vascular fulness, thus originating and predominating in the veins, are most common in persons advanced in life. On the other hand, local determinations of blood proceed chiefly from capillary expansion and arterial action, without venous obstruction; are most commonly observed in the young and those in the prime of life, and most frequently pass into the sthenic forms of inflammation.

98. But there are other states of the vascular system, upon which as much, probably, depends, not only in disposing to, but also in exciting morbid vascular action, as upon vascular fulness, and to which very inadequate attention has been paid. These are the accumulation of effete and hurtful materials or elements in the blood, owing to imperfect depurating function. When the excreting functions of the kidneys, of the skin, of the liver, and even of the large bowels, are inadequately performed, the excess of hurtful, highly animalized, and irritating substances in the blood, as urea, &c., both predisposes to and excites inflammation in parts most susceptible of this cause of irritation, from previous disorder, or peculiarity of structure or function. Irritating matters, also, may be carried from the digestive organs, or other parts, into the blood, where they may act in a way similar to those just mentioned. Thus, inordinately exciting articles of food or drink, accumulated excrementitious matters in the biliary organs and intestinal canal, and morbid secretions pent up in any part of the body, are often absorbed into the circulation, and produce inflammations, varying in character with the kind of morbid matter producing it. (See art. Absorption.)

99. *g.* The *influence of the digestive organs* in the production of inflammations has been acknowledged, since it was insisted upon by John Hunter; but it is very probable that the disorder of these organs, thus predisposing to inflammations, and the predisposition itself, are associated effects of deranged organic nervous influence. There can be no doubt, however, that when the functions of the stomach and bowels are disordered or impaired, and when the liver is torpid, and accumulations of bile are formed in the biliary ducts or gall-bladder, a predisposition to inflammations is not only thus induced, but also a greater tendency to asthenic action is thereby generated. The state of the digestive organs often indicates the degree of organic nervous power attending upon the disease; whatever deranges their functions, or aggravates existing disorder in them, increasing the general and local affection,

and changing sthenic to asthenic action. The disorder induced in the organs of digestion generally extends to the organs of excretion, not only by the direct sympathy arising from nervous endowment, and from the dependance of both classes of organs upon the same nervous influence, but also by the changes produced by the former in the circulating fluids, the predisposition to morbid vascular action being accordingly heightened.

100. *h. Mental emotions* also favour the occurrence of inflammation, when excessive. Violent fits of passion may even excite the disease, particularly in the brain, liver, or heart. The depressing passions, when extreme or of long continuance, induce the more chronic or asthenic states of morbid action, or cause the sthenic disease to assume either of these forms. The exhaustion consequent upon protracted or excessive nervous sensibility, and upon pain, has a similar effect. When pain is very violent, it seems to act like to concussion of the nervous masses or of the body, and to severe crushing injuries or wounds: they all depress organic nervous power, and, when inflammation takes place, give rise to an asthenic or spreading form of the disease.

101. *i.* A predisposition to inflammations is often inherent in the frame from *hereditary conformation* or temperament (§ 93), and from *previously disordered states* of certain organs or tissues. Parts which have been formerly inflamed are most prone to experience a recurrence of the disease. Organs which are liable to simple excitation, or to actively increased function, are generally much disposed to the different grades of sthenic inflammatory action; while those which are torpid, debilitated, or exhausted are most prone to the asthenic states. Persons whose mental faculties have been inordinately exercised are most disposed to inflammations of the brain and their consequences; and those who have over-excited or exhausted the digestive organs by too much or too rich food, and by intoxicating liquors, are most liable to inflammatory affections of the stomach, liver, and bowels.

102. *k.* The influence of *temperature, season, and climate* is shown, not only by their favouring the appearance, but also by their modifying the characters and forms of inflammations. High ranges of atmospheric heat produce inflammations of the liver, stomach, and brain; and, if heat be conjoined with humidity, these diseases assume a low or asthenic form, the bowels being frequently also affected. Prolonged high temperature, especially when aided by humidity, changes the state of blood, affects the biliary functions, and imparts a peculiar character to inflammatory diseases. Thus, in autumn, after hot summers, these maladies are frequently associated with marked gastric or bilious disorder; and in winter and spring, when the air is cold and humid, they often present an erysipelatous or catarrhal form. A cold and dry state of the air is generally wholesome, if due exercise be taken; and, without favouring the occurrence of inflammations, imparts to them an acute and sthenic character, the respiratory organs being the most liable to be affected. But there are other conditions of the air, or prevailing atmospheric constitutions, which dispose to inflammations, and bestow upon them, for a certain period, peculiar forms or features. The sources of these have not been ascertained, although they may probably be referred to electrical states and terrestrial emanations. However these prevailing constitutions may arise, there can be no doubt of their influence on inflammations, and of the necessity of ascertaining their nature and effects, as being requisite to an appropriate and successful method of cure.

103. From what has just been advanced, the influence of *climate* on inflammatory diseases may be partly inferred; for as the climate partakes the most of either of the foregoing characters, so will these diseases be prevalent or be modified. In cold, variable, and humid climates, inflammations of the respiratory organs, and the rheumatic and scrofulous diathesis, are most common. In warm, humid countries, inflammatory action appears chiefly in the liver, digestive canal, and spleen; and especially when exhalations from the soil also come into operation, it either assumes, or rapidly passes into asthenic forms.

104. It should be kept in recollection that several of these *causes of predisposition* sometimes act conjointly; that they may be sufficient of themselves to occasion inflammation, although they generally require the more efficient or determining action of the *exciting causes* next to be considered; and that, as most of them either continue in operation during the disease or are inherent in the constitution, *they exert a very marked effect upon the form, progress, and consequences of the disease.* Hence the necessity of ascertaining them fully, and of appreciating them correctly, in order to treat with success the disease they are concerned in causing.

105. ii. The Exciting Causes are very numerous and diversified, but uncertain in their operation, or ascertained with great difficulty. Many of the predisposing causes, owing to their more intense or combined action, sometimes of themselves produce inflammations; and, in such cases, the effect does not always appear in very obvious connexion with its real cause. In many instances of visceral inflammation, the exciting cause is very obscure, the disease proceeding rather from a combination of circumstances—some of them of fortuitous occurrence—than from any one very obvious agency. The more direct causes may be considered with reference to their *mode of action* in producing the morbid effect: 1st. Certain of them act by injuring the organization; 2dly. Some excite the organic nervous sensibility of the part, and, consecutively, vascular action in it; 3dly. Others operate by affecting the function and circulation of the organ; inflammation resulting from those alterations in connexion with predisposition; 4thly. Many produce a specific or truly morbid action in the part, changing the organic nervous sensibility, the vascular action, and all the vital conditions, both locally and generally; 5thly. Morbid matters secreted by an organ, or carried into the blood from a diseased part, may occasion inflammation by their direct effect upon the capillary vessels, as well as in one or other of the above modes; inflammation of one part thus giving rise, by means of some one of its consequences, to inflammation of another; and the morbid secretions from

one organ inflaming others with which they come in contact.

106. *A. The causes which act by injuring the organization* are chiefly all external injuries, which divide, lacerate, or bruise a part. Structures cleanly divided by a very sharp instrument are much less disposed to inflame than those which are lacerated, bruised, or punctured. *Lacerated parts* undergo much greater injury of organization than simple division; their nervous fibrils and vessels are torn, and both these constituents of structure are thereby severely affected, the vitality of the part being often either directly or consecutively destroyed, and sloughing frequently taking place. Violent *contusions* sometimes so disorganize a part as to prevent it from recovering any share of vital action. It then soon dies, and is cast off, or the system sinks under the shock primarily experienced, and the depression consecutively caused by the extent of local mischief, without inflammation having been fully developed. When contusions are slight, they recover without inflammation taking place; but when the capillaries are injured, or when their contents have partially escaped into the tissues of the part, or even when their tone is so much exhausted as to admit of much effusion, and especially when the cohesion of the textures has been more or less altered or overcome, inflammatory action is very liable to occur, although it does not necessarily take place. *Punctured wounds* readily induce inflammation, and generally in proportion to the bluntness of the instrument. A triangular or round instrument also produces it more readily than a flat and sharp one. The disposition to inflammation from punctured wounds chiefly depends upon their extent, upon the nature of the structures which are implicated by them, upon the quantity of blood effused in the parts which they have penetrated, and upon the state of the constitution. Punctures of tendons, nerves, capsules, and aponeuroses are much more injurious than of other parts; and the constitutional affection, in relation to the local injury and resulting inflammation, is very much greater. When much blood is effused without a sufficient outlet, the punctured part being distended by it, and when blood is effused at the bottom of the wound, or in surrounding tissues, inflammation readily takes place, this fluid usually exciting inflammation in parts to which it is naturally foreign. The effects frequently also depend upon the nature of the body by which the puncture has been made. The teeth, claws, spurs, and spines of animals and fishes generally produce very severe and even dangerous injuries, the punctures inflaming readily and rapidly, although no poisonous fluid has been inserted in them.

107. *Concussions* or severe shocks are often followed by inflammation. The parts which suffer from this cause are chiefly the brain, the spinal chord, the liver, and spleen. It is not only organic nervous power that is dissipated or exhausted in such cases, but the organization is often more or less changed, minute lacerations of structure, or of capillary vessels, and consequent effusions or ecchymoses, being often found. The suspension of the functions caused by concussion is remarkably prone to pass into inflammatory reaction when this species of injury does not altogether extinguish them. Severe or prolonged *pressure* of parts often causes an asthenic inflammation of them, quickly passing into ulceration or gangrene. The *removal* of a gradually-increased or continued pressure is often followed by a local and general inflammatory reaction, which in some cases, and as respects certain structures, becomes very acute, as in the peritonitis consequent upon parturition, and upon tapping dropsies of the abdomen. *Ligatures*, or other causes of constriction, act by impeding the venous circulation, and various *positions* have a similar effect. They also aggravate inflammation when otherwise produced.

108. Various substances affect the organization of a part so as to induce inflammation, especially *mineral substances*. When these are applied in concentrated states they destroy the organization, inflammation appearing around the injured part. The pure alkalies, the strong acids, and certain of their salts have this effect; but in weaker states they inflame the tissues in the mode next to be considered (§ 109). The bi-chloride of mercury, arsenious acid, &c., in an undiluted state, decompose or destroy the vital cohesion of the part; but in a weaker state they affect the organic sensibility and vascular action, thereby causing inflammation and certain of its consequences. *Extremes of temperature* affect the organization almost directly, although in less grades; they act chiefly in the manner just mentioned.

109. *B. The causes which excite the organic nervous sensibility and the vascular action of the part*, are all those substances which are classed as stimulants or irritants. They act directly, and chiefly on the parts to which they are applied. Inflammations of the skin, intestinal canal, urinary organs, and even of the respiratory passages, generally proceed from these sources. Prolonged friction, flagellation, the application of any of the above substances to the skin, or the ingestion of them into the stomach, and high ranges of temperature, produce inflammation in this way. Volatile or diffusible stimulants, irritating gases, and fine particles of mineral or vegetable substances floating in the air, often inflame the respiratory passages. The atmospheric air, especially the oxygen of it, frequently inflames parts whose organization is not suited to exposure to it. When the serous membranes of shut cavities are exposed to the *air* they first become dry, afterward more vascular than natural, and ultimately covered with a thin exudation of lymph, varying in thickness, and in the proportions of serum and coagulable albumen, with the intensity of vascular action, the constitution of the patient, and the powers of life. Mucous surfaces deprived of their epithelium, the skin without its cuticle, and other exposed or divided textures are similarly affected, inflammation frequently supervening, unless when the lymph thrown out coagulates over them and completely protects them from the air; and then the process of restoration usually takes place underneath the protection thus formed. Stimulating substances may be taken into the stomach, and pass from it into the circulation, without materially affecting the digestive organs, and yet they may inflame the organs by which they are excreted. Thus, cantharides and turpentine cause acute nephritis; and spirituous

liquors and the prolonged exhibition of iodine excite chronic inflammation and organic lesion of the kidneys, giving rise to dropsy. Low ranges of temperature also sometimes occasion inflammation, not, however, by directly exciting the nervous influence and vascular action, but by remarkably depressing both in the first instance, the consequent reaction proceeding to an excessive, severe, or prolonged state of inflammation. (See articles Cold and Gangrene.)

110. *C. The causes which affect the functions and circulation of an organ, aided by predisposition*, are numerous, and, like the preceding class, hardly admit of enumeration. Whatever inordinately excites the natural actions, and thereby the circulation of an organ, or whatever primarily stimulates the vascular action of a part, will frequently occasion inflammation of it; for the increased function or circulation will run on to inflammatory action whenever a strong predisposition is present in the organ or constitution. The energetic actions of the brain are attended by augmented circulation, which may pass into inflammation. Increased function of the liver is often followed by inflammation of it. Excessive indulgence of the appetite and excitement of the stomach often precede some of the forms of gastritis or enteritis. In these cases the natural actions are first inordinately excited, and morbid vascular action is thereby induced; but in other instances the order of morbid procession is reversed: the causes increase the circulation in the organ before the function is materially deranged. Thus *cold*, instead of benumbing sensibility, and of giving rise to a morbid vascular reaction upon its removal, in external or other parts on which it acts, often determines the momentum of the circulation upon internal viscera and surfaces; and if these be not partially relieved from the load or congestion thereby occasioned, by a free exercise of their functions, inflammation is a frequent consequence. Interruption of the exhalation from the skin, constriction of the surface, and diminished circulation both there and in the extremities, combine to drive the blood upon the mucous surfaces and parenchymatous viscera, increased function, augmented secretion, or morbid vascular action resulting therefrom, according to the states of constitutional power or of predisposition, and to the continuance or intensity of the cause. When cold is not protracted or intense, relatively to the constitutional energy and predisposition of the individual, the internal functions, especially those of digestion and of excretion, the urinary particularly, are increased, and inflammatory action does not take place; but when the internal determination is not relieved by augmented secretion, nor removed by a restoration of the circulation to the surface and extremities, inflammation of the predisposed organ is often the consequence. Sudden, continued, or frequent exposures to cold, vicissitudes of temperature, and partial exposure to currents of cold air, to humidity, &c., are the most common causes of internal inflammation, and especially of the respiratory organs. As respects these organs particularly, it is not the sedative influence of cold acting upon exhaling surfaces, the seat of active organic functions, but the reaction consequent upon the removal of this influence, that occasions the inflammation, the primary influence of cold only disposing the part to inflame when reaction takes place, or modifying the reaction so as to cause it to run on to inflammation. Hence it is that persons, after going into a cold air from a warm apartment, generally escape inflammation of the air-passages, unless they be perspiring, or the predisposition to inflammation be strong, when they avoid a sudden return to a high temperature, by which reaction is liable to be morbidly increased; and hence the greater danger from exposure to much warmth after the prolonged or intense influence of cold than from the cold without the subsequent injurious action of heat.

111. *D. The specific causes of inflammation*, whereby the organic nervous sensibility, the vascular action, and all the vital conditions are truly morbidly altered, both locally and generally, comprise all infectious, contagious, and contaminating matters, particularly when applied to an abraded surface or wound. Most of the substances forming the second and third classes of *infectious agents* (see art. Infection, § 4), and arranged also under the head of Animal Poisons (see that article), produce inflammation, presenting one or other of the local and general forms described under the asthenic species (§ 54, *et seq.*). The secretions and fluids of one person may excite inflammation when applied, as just stated, to another; but the effect is more certainly produced when these matters are taken from the dead body, and especially when they are the product of inflammatory or other disease. The serous, puriform, sanious, or sero-puriform fluids generated by specific or constitutional maladies, and by diffused inflammations of the peritoneum, or even of other serous surfaces, possess the property of exciting the asthenic or diffusive forms of inflammatory action in a very remarkable manner. The most dangerous effects generally follow the inoculation of these fluids from the recently dead, or from the still warm body, or even the application of them to the skin. The next most noxious effects result from the introduction of animal matter in a very far advanced stage of putrefaction. In both cases, but in the former especially, the constitutional affection is most severe (§ 59). Even when the local injury is hardly to be perceived, as well as when it is more manifest (vesicles or pustules arising in its vicinity), inflammation extends through the cellular tissue in the course chiefly of the lymphatics or veins, sometimes implicating these vessels, and abscesses form under the muscles, particularly under the pectoral and other muscles of the chest, a great part of the cellular tissue on the trunk, and even the serous surfaces underneath, becoming implicated in the disease. Occasionally the inflammation presents the characters of some one of the varieties of *erysipelas:* the particular form of the local, as well as of the general affection, depending upon the constitution and previous health of the patient, and upon the nature or properties of the animal poison. The most virulent of the morbid poisons seems to be the fluid effused in the large cavities, and particularly that found after puerperal peritonitis in recently dead bodies. The recent brain, the

substance of fungoid, carcinomatous, and medullary tumours, and the sanious fluids proceeding from diffusive, erysipelatous, and gangrenous inflammations, are also frequently productive of most noxious effects.

95. Although the most dangerous form of inflammation is caused by the fluids of the recent human subject, yet those of recently-killed *animals* produce no such effect. This probably arises from death being caused in the former by disease, in the latter by bleeding during a state of health. When, however, the fluids of animals which are either diseased or under the influence of inordinate excitement, or of its more immediate effects, are applied to a wound or denuded surface, the effects are often severe, although not so dangerous as in the former cases. (See arts. Infection, and Poisons—*Animal.*)

112. iii. Consecutive Inflammations.—*Morbid matters secreted by an organ, or circulating in the blood, frequently produce inflammation of either neighbouring or distant organs.*—This is an important class of causes, and, like that immediately preceding, generally occasions the asthenic or diffusive forms of inflammation. When the natural secretions of an organ are rendered unusually morbid or irritating, either from perverted action, or from the accumulation of noxious elements in the blood, the canals through which they pass are often irritated and inflamed by them. The morbid bile formed during affections of the liver, or in the course of gastric, bilious, remittent, and continued fevers, often occasion the enteric or dysenteric complications occurring in these diseases. Inflammations of the colon and rectum also often arise from this cause, as well as those of the gall-bladder and bile-ducts. The secretions on the surface of the skin, especially when allowed to accumulate and remain on it, are the most frequent causes of cutaneous inflammation; and alterations of the urine often occasion inflammation of the urinary bladder. Indeed, most of the complications appearing in the course of febrile diseases arise either from the morbid state of the secreted fluids or from that of the blood itself, the organic influence being remarkably susceptible of their impressions, and the vascular system being readily excited by them to an increased action, devoid of power or healthy tone. When vital power or organic nervous influence is extremely depressed, as in adynamic, typhoid, or exanthematous fevers, the parts with which diseased secretions come in contact are unable to resist the impression made by them, or to throw them off by means of a healthy secretion from their own surfaces, and by sthenic muscular action. Hence this impression is soon followed by asthenic inflammation.

113. Morbid matters may also be *absorbed* from mucous surfaces, from hollow organs, or from the more solid structures in which they have been formed, and be carried by the lymphatics to glands, and even into the veins and general current of the circulation; and they may, moreover, be formed on the internal surfaces of the vessels themselves, contaminating the blood in either case, or altering it in such a manner as to excite inflammation in various different and distant organs. Sanious or morbid fluids may be taken up from the cavity of the uterus, and, passing into the veins and blood, occasion phlebitis or other forms of malignant puerperal disease. Morbid secretions in the intestinal canal may be absorbed and carried into the blood of the vena porta, and excite diffused or other forms of hepatitis; these results taking place the more readily the more unhealthy the secretions are that are accumulated in these situations, and the more depressed the vital powers.

114. iv. Secondary Inflammations.—Morbid matters, also, from *primary* inflammations, may excite *secondary* inflammations, 1st. In the course of connecting cellular tissues or membranous surfaces; 2dly. In lymphatics and absorbent glands; 3dly. In veins; 4thly. In parenchymatous viscera; 5thly. In synovial capsules, &c.; and, 6thly. In serous or mucous surfaces. The secondary disease, in either of these situations, is most frequent when the morbid matters from the primary inflammation are effused in the substance of a part without being confined or limited by a barrier or cyst formed by coagulable lymph, and when organic or nervous power is much depressed.—*a.* The *mode* in which the consecutive or secondary disease is developed is different in most of these situations, and is perhaps doubtful as respects some of them. When the primary inflammation of *membranous surfaces* or of *cellular* or *adipose tissues* is asthenic, it is not only disposed to extend in every direction without any break or interval, but it often advances to distant or even remote parts without the intervals presenting any manifest change, and after various intervals of time. Several states of erysipelas and diffused inflammation of the cellular tissue, and of mucous and of serous membranes, illustrate this. When the extension of the disease is continuous, the nature of the tissue, and the infiltration of the fluids from the primary inflamed part, are the chief causes of it, in connexion with weak powers of resistance; but when a part opposite to or adjoining an inflamed surface also becomes inflamed, without the intervals between both being affected, the cause will generally be found to have been the fluids effused from the part first inflamed, which have acted as excitants or irritants of the healthy parts with which they have come in contact. Inflammations of serous, cutaneous, and mucous tissues frequently illustrate this fact. When distant parts are secondarily affected without admitting of this explanation, we can only infer that, as long as constitutional disease exists, so long will it continue to manifest itself locally or externally, or in some part or other of the same tissue which it is most disposed to affect, or in some other predisposed part.

115. *b.* In several asthenic, specific, and chronic states of inflammation, the morbid matter absorbed from the primary seats of disease inflames chiefly either the *absorbents* or the *glands*, or both the *lymphatics* and *glands*; the former often in their whole course, from the primary lesion till the glands are reached, the latter principally in the groins, arm-pits, and neck. In either case, the connecting and surrounding cellular tissue is also inflamed, small abscesses are formed, or a diffused infiltration of a sero-puriform, sanious, or ichorous matter takes place in their vicinity, especially around

the glands; and the disease is thus complicated and prolonged. The constitutional powers in these cases are affected more and more seriously, owing to the effect produced either upon the organic nervous influence, or upon the vascular system and blood itself, or to these causes combined; but the local, and especially the general disease presents characters having more or less reference to the primary or exciting cause, from which, indeed, it derives its specific characters, as when inflammations are caused by a specific animal poison.

116. *c.* The *veins* are often the seat of the consecutive inflammation, especially after the primary asthenic forms of the disease, or when the powers of life are depressed; when the fluid products of inflammation are effused upon wounded or divided surfaces, or are insufficiently confined by the effusion of coagulable lymph, or by cysts; and when morbid secretions remain long in contact with absorbing surfaces, or in situations where venous imbibition may take place, as in the cavity of the uterus after delivery, and on divided surfaces after amputations and other surgical operations. In these cases, the consecutive phlebitis assumes various characters, according to the constitutional powers of the patient. If the vital powers be not materially reduced, coagulable lymph is thrown out upon the internal membrane of the veins, and the blood is thereby coagulated in them. The circulation through them is thus arrested, and the products of inflammation are prevented from mixing with the mass of blood. In such cases, the inflammation sometimes extends to the more external coats of the vein, and small abscesses form externally to them, and press upon and obliterate their canals, the obstruction to the circulation in them thus occasioned farther preventing contamination of the fluids. In other cases purulent matter is secreted within the vein, and is partially confined either by coagula or by albuminous exudations on the internal surface of the vessel, or by both; and, in some instances, even when these have been formed, the puriform matter has evidently mixed with the blood without coagulating it. When pus has been found in the centre of coagula, it is extremely probable that it has caused the coagulation of the fibrinous portion of the blood in the partially obstructed vessel, and has thus become enclosed in the coagula. When the powers of life are extremely depressed, the secondary phlebitis is not limited by an effusion within the vessels of coagulable lymph, with or without pure pus, and by an extension of the inflammatory action to the external coats and connecting cellular tissue, as in the above states of the disease, but is rapidly extended along the internal surface of the veins; the morbid secretion from the surface not consisting of coagulable or healthy lymph, or even of pus, but of a seropuriform, or of a sanious or ichorous fluid, which is not capable of coagulating the blood in the inflamed veins, but which readily mixes with it and contaminates it, thereby producing all the phenomena of adynamic or malignant fever. (See art. Veins—*Inflammation of.*)

117. *d.* Inflammations of *parenchymatous or other viscera* are often *secondary or consecutive* upon primary inflammation of remote or external parts. The brain, the lungs, liver, and kidneys are most frequently thus remotely affected. In these cases there may be extensive inflammatory appearances without purulent collections; but most frequently one or more purulent collections, or distinct abscesses, or merely puriform infiltrations of the inflamed parts, are observed. In some instances the puriform collections and infiltrations are attended either by very few marks of inflammatory action, or by almost none, so as to render it even doubtful whether they have resulted from inflammation, or from a simple deposition, or separation from the capillaries of the secondarily diseased part of the morbid fluids absorbed into and circulating with the blood. I believe, however, that in these cases the morbid matter in the blood excites a sufficient degree of inflammatory irritation of the capillaries of this part to form the diseased secretion infiltrating it; and that, as in other instances where inflammation has unequivocally existed during life, the principal indications of it, in the affected tissues, have vanished soon after death.

118. When secondary inflammation seizes upon a parenchymatous organ, remote from that primarily affected, it will generally be found that it is owing to the passage of the morbid fluids from the primary seat of inflammation into the blood, these fluids consecutively inflaming the parts most predisposed. In some cases the secondary disease has been preceded by, and is associated with phlebitis; in others, this complication cannot be detected. Even in cases of primary, as well as of consecutive phlebitis, secondary inflammations of internal viscera, with purulent collections or infiltrations, are very frequent. But this subject is fully discussed in the articles Abscess and Veins.

119. *e.* Consecutive inflammations of *synovial capsules*, and in *serous surfaces*, are observed chiefly in similar cases and circumstances to those just described (§ 115, 118), when the blood contains morbid secretions, or when the veins are inflamed and the powers of life much reduced. The former of these structures are often affected by the contamination of the fluids consequent upon syphilis, and upon the subsidence of confluent smallpox; the latter in the advanced stages of diffusive inflammation of the cellular tissue, or of phlebitis, or of inflammation of the lymphatics, particularly when either disease extends to the trunk. It also is sometimes consequent upon extensive burns or scalds, especially when the surfaces over the large cavities are primarily inflamed by these accidents.

120. *f. Mucous surfaces* are secondarily inflamed, both by the passage of the fluid products of primary inflammation over them, as when laryngitis or bronchitis supervenes upon an ulcerated cavity in the lungs, and by the absorption of these products into the blood. These surfaces, especially those of the large bowels, perform an excreting as well as a secreting function, and the morbid matters, in the course of their elimination from the circulation, excite inflammatory action, generally of an asthenic form, not only in these surfaces, but also in other organs performing similar offices, as the kidneys, liver, &c. Thus, secondary inflammation and ulceration of the large bowels, kidneys, &c., often occur in the course of tuber-

cular excavation and ulceration of the lungs, and of abscesses in the liver.

121. VI. PROGNOSIS.—The prognosis of inflammation can be stated only in general terms. The more special circumstances connected with this subject must necessarily be considered in the articles devoted to the inflammations of particular organs and textures; for the result will mainly depend upon the organ affected, as well as upon the form, severity, and stage of the disease, and upon the consequences which may have already taken place.

122. *A. As to the organ or structure affected*, it is unnecessary to state more than that the danger of inflammation is great in proportion to the vital importance of the affected part. Acute inflammations of the stomach, of the intestines, of the lungs, of the heart, of the brain, of the liver, and of the kidneys are all attended by more or less risk, owing to the disturbance of function attending them, to the shock which the whole frame experiences from the attack, and to the consequences and changes of structure, or the disorganization which they often occasion. Yet the danger is still greater when the *blood-vessels*, whether arteries or veins, are inflamed; for the products of the morbid action are then liable to mix with and to contaminate the blood, and thereby to infect, in a very dangerous manner, the whole frame. Inflammations of *serous membranes*, particularly at advanced stages, and in unhealthy subjects, are always attended by great risk of life; for the fluids effused by the disease either accumulate to a fatal extent in the shut cavities they form, if effusion be not early prevented or restrained, or agglutinate their opposing surfaces, so as to impede the functions of parts and to occasion dangerous consecutive disease. Much, also, of the risk attending inflammation of parenchymatous organs proceeds from the extension of the disease to their serous surfaces, and from the effusion consequent thereon. Inflammations of *mucous surfaces* are much less dangerous than those already mentioned; and chiefly because the secretions which they produce favour a resolution of the morbid action, and are thrown off the diseased surface, a source of irritation being thus removed. They often, however, occasion great risk to life, by the extent of surface affected, and by the disturbance of the functions performed by it, as in cases of universal bronchitis, where the changes produced by the air on the blood are impeded both by the disease and by the morbid secretion produced by it. Inflammation may also extend from these surfaces to adjoining structures; the substance of vital organs, and even their serous envelopes, becoming extensively implicated, and the danger proportionately increased. The *consecutive*, and particularly the *secondary inflammations* described above (§ 112, 114), are always most dangerous.

123. *B. The form and severity of the inflammation* necessarily influence the prognosis. In general, the *asthenic forms* are much more dangerous, other circumstances being the same, than the *sthenic*. Yet a very acute sthenic state of the disease, especially of internal viscera, may be as rapidly fatal as any other, the intensity of the morbid action soon exhausting vital power, and superinducing the more unfavourable consequences and terminations already described, especially copious effusion, suppuration, gangrene, &c. The asthenic states of inflammation, even in external and non-vital parts, are seldom devoid of danger, unless they are early subjected to a most judicious treatment, for they generally originate in unfavourable circumstances: either the constitution of the patient is impaired, and the assimilating and excreting functions are weakened, or the causes which produced them are poisonous, contaminating, or infectious. Their diffusive or spreading character, generally arising out of these circumstances, increases the risk, not merely from the extent of the diseased state that results, but also from the contamination of the circulating fluids that often takes place, and the consequent depression of the powers of life.

124. *C. The age, strength, previous health, diathesis*, and *habits of the patient* are concerned, not only in favouring the production and the character of the inflammation, but also in modifying its course, consequences, and terminations. Early age, strength of constitution, and previous good health are generally favourable circumstances, in respect both of the form and result of the disease; yet, in very robust and plethoric persons, accustomed to active exercise in the open air, and in the habit of drinking largely of malt or spirituous liquors, inflammation is apt to assume a most intense form, rapidly terminating in gangrene, effusion, or abscess. Inflammations of previously weakened or diseased organs, or of parts which have formerly been the seat of inflammation or congestion, and in the scrofulous, gouty, or rheumatic diathesis, are more or less unfavourable, particularly if affecting internal viscera, and, even in the mildest forms, are managed with great difficulty. The habits and modes of life of the patient remarkably influence the prognosis. Persons who live temperately and abstemiously, and particularly those who partake of little animal food, and who abstain from stimulating beverages, are seldom subject to severe or dangerous inflammation. On the other hand, persons who live grossly, who eat much animal food, and who drink much malt and spirituous liquors, experience the most severe and unfavourable forms of the disease, especially if they are engaged in sedentary occupations or take insufficient exercise.

125. *D.* It is obvious that inflammations are more unfavourable in *an advanced stage* than when they come under treatment at an early period; but the degree of danger will depend chiefly upon the consequences to which they have already given rise, and to the seat and form of, and other circumstances connected with the attack. The *extent* and exact *condition* of the local affection, and of the *effusion* which has taken place; the extent to which the functions of the affected organ are impeded; the commencement or presence of *suppuration*, or the imminent risk of *abscess*; the state, severity, and character of *the constitutional affection*; the degree of disorder manifested by the digestive, excreting, circulating, and nervous systems; and the state of the vital powers, must all be taken into account, and an opinion formed conformably with the conditions they severally present; for, in proportion to the progress of the disease, and of any of its consequences,

and to the amount of disorder manifested by the constitution generally, or by a vital organ in particular, will the risk of an unfavourable issue be great, especially if an internal viscus be the seat of inflammation. The degree in which the cause of the disease may operate during its continuance should also influence an opinion as to the result; for it is obvious that persistence of the causes will increase and prolong the effect, and render the consequences more unfavourable than when the causes have been removed. (See arts. ABSCESS, ADHESIONS, GANGRENE, and the articles on the diseases of the individual tissues.)

126. VII. THEORY OR NATURE OF INFLAMMATION.—The various states of inflammation cannot be satisfactorily considered without reference to the structure and vital relations of the arterial and capillary vessels, and, indeed, of the vascular system generally.—*A*. The *external* or *cellular coat* of arteries is more dense than common cellular tissue, and hence it rarely partakes of the serous infiltration of this tissue. It sometimes, however, is the seat of inflammatory exudations, particularly of coagulable lymph; and it occasionally contains a small quantity of pus, and more rarely of extravasated blood. It possesses the greatest degree of tenacity of any of the coats. The *middle* or *fibrous* coat is highly elastic, particularly in the circular direction of the fibres, and consists of a substance in all respects resembling the elastic ligament of the spine. The fibres composing this tunic are connected by fine cellular tissue, but are easily separated by the pressure of a ligature. This coat is most developed in the large arterial trunks, and most subject to the impulse of the heart; it almost disappears in the smaller arteries, and entirely in the capillaries. The elastic power which it exerts keeps up a continued pressure on the column of blood in the arteries; diminishing, however, with their size, until it nearly ceases in the capillaries. This elasticity accommodates the vessels to the quantity of blood passing through them, and facilitates the circulation by the pressure and reaction exerted on their contents. The *internal* or *membranous coat* is highly polished on its internal surface, is transparent, and, although it resembles the finer serous membranes, it is more friable on pressure, and yet more elastic than they.

127. In the finer arterial branches and capillary vessels the fibrous or middle coat of the arteries disappears, so that these vessels seem to consist only of membranous canals, surrounded by cellular tissue. The muscularity and irritability of these vessels, although the subjects of so much discussion from the days of VACCA and HALLER, are mere figments, which now deserve not the least notice. The muscularity does not exist, and the irritability is merely simulated by the changes consequent upon the application of agents which affect the organic nervous influence and vital contractility of the tissues and capillaries.

128. The *nerves* which supply the arteries and capillaries are chiefly ganglial, or derived from the organic or sympathetic system; but filaments from adjacent parts of the cerebro-spinal nervous system communicate with them. Ganglial nerves have been traced around the arteries as far as the interior of the cranium, and the principal arteries of the extremities, by WEBER and the author, in 1816 and 1817, and more recently by RIBES and others; and there can be no doubt that they extend even to the capillaries, endowing these vessels with influence, and with the properties evinced by them in health and disease.

129. The *vital states* which arteries and capillaries manifest, especially when influenced by stimulants or depressants, are these: 1st. Of turgescence, dilatation, or enlargement; 2d. Of contraction or constriction; and, 3d. Of healthy or natural tone. The first and second are anormal states, the third normal, and consistent with all the natural functions. It is to the *first* of these that attention is principally to be directed in discussing the nature of inflammation; but, before this state is considered, a very few remarks may be offered on the others particularized.

130. *a*. The *constriction* of arteries and capillaries arises chiefly from agents which increase the vital contractility of tissues. Many of these agents are of very opposite natures, and yet they act, particularly in certain grades of activity and periods of operation, in definite modes. Cold, fear, and other depressing passions, severe injuries, shocks to the system, &c., contract parts susceptible of organic contractility, especially the skin; arterial, capillary, and venous canals; cellular and serous tissues, &c., &c.; but, if the operation of these agents is intense or long continued, the natural tone of the contractile tissues and vessels is impaired, and vital exhaustion or relaxation ensues. A similar constriction of these parts follows the application of astringents and refrigerants; the sudden diminution of the circulating fluids, as by hæmorrhage or venæsection; and the depression of vital power by whatever cause. The contraction of arteries and capillaries soon after death depends chiefly upon the weakened injection of blood into these vessels just before dissolution, and to the entire cessation of the action of the left ventricle. The organic or vital contractility of arteries and capillaries is then no longer antagonized by the action of the ventricles upon the column of blood they contain, and is consequently allowed to advance to the utmost permitted by the fibrous and cellular coats; the arteries, and even the capillaries, being consequently found nearly empty and constricted after death. But as contractile parts lose their rigidity or tone with the incipient decomposition of the structures, the vessels afterward relax, so as to allow a larger column of fluid to be injected through them than in the living state.

131. *b*. In the *healthy* or *natural tone* of contractile tissues, the arteries, capillaries, and even the veins, fully participate. Still, this natural state of the vessels is liable to various deviations or deflexions, either to the side of turgescence or to that of constriction, without amounting to what constitutes a truly morbid condition. Numerous causes produce either constriction or turgescence, without reaching the pitch truly injurious. It is chiefly when the action of the causes is intense or continued, or when they alter, by their primary and specific influence, the vital properties of the sentient system and contractile tissues, that the effect becomes truly morbid, and diseased ac-

tion is set up. Much, however, depends, in such cases, upon constitutional disposition, or the degree and kind of susceptibility existing at the time of exposure to the causes. Agents which produce no derangement in some persons violently affect others, and the same cause, which was without effect at one time, may be most injurious at another, owing to varying states of organic nervous energy and susceptibility.

132. *c.* The *state of turgescence, dilatation,* or *enlargement* of the smaller arteries and capillaries, although a part of the inflammatory act, does not alone constitute it. Something more is necessary to its unequivocal production. This state may take place without being at all morbid, as in the excitement of erectile parts, in the development of the uterus and mammæ during pregnancy, in the enlargement of collateral vessels after the obstruction of a large artery, in the act of blushing, and in the rapid growth or restoration of parts. It may even be morbid, or, at least, the source of disorder, without constituting inflammation. The active congestions and determinations of blood to particular organs, although often passing into inflammation, yet are very different from it. In these vascular disorders, more or less turgescence or dilatation of the smaller arteries and capillaries, as well as of the smaller veins, obviously exists; but still this state is not attended by the same phenomena, and does not give rise to the same consequences as are observed in the various forms of inflammation. This state of turgescence of the capillaries of inflamed tissues has especially fixed the attention of modern pathologists; and the question with them has been almost limited to the inquiry, as to whether the increased diameter of the capillaries is to be imputed to relaxation, or debility, or to augmented action. The least material point of the many which should have fixed their attention has thus alone engaged the whole of it; and, while they have attributed everything to one or other of these conditions, they have entirely overlooked the fact that they are both contingent or consecutive changes, that either may exist according to the stage and form of the morbid action, and that the one as well as the other may be present quite independently of, and without inflammatory action.

133. The *state of the capillary circulation* in inflammation has been agitated since the commencement of the present century, and even at the present day, with a parade of useless, deceptive, and ill-conducted inquiry, dignified with the name of experiment. Numerous cold-blooded and other reptiles, and often animals, very differently organized from the higher species, have been tortured for evidence, whereupon an argument might be hung in behalf of preconceived hypotheses; and crude and puerile observations have been made the basis of doctrines, which have failed of attracting notice, either from having been imperfectly understood, even by their propounders, or from having been overlaid by the multitude of words in which attempts have been made to convey them. Thus the author of a recent work, entitled "A Critical and Experimental Essay on the Circulation of the Blood," &c., not only derives his inferences from imperfect observations, made at similar sources to the above, but also, because he observed an oscillating motion of the blood in the aorta of a frog after tying the vessel, jumps to the conclusion that "it would appear almost certain that the arteries possess a muscular contractile power;" although the previous inquiry, as to the existence of a muscular structure in the coats of these vessels, that some honest observers might, perhaps, have thought necessary, had never been entered upon by the author.

> "Such reasoning falls like an inverted cone,
> Wanting its proper base to stand upon."

134. Before entering upon a fuller explanation of my own views as to the theory of inflammation, and which are essentially the same as were published at first, more than twenty years ago, and at several times subsequently, the opinions of some writers most deserving notice may be adduced; although, as respects inflammation especially, a rational explanation of phenomena, as they are subject to our senses, is to be preferred to a mere collection of opinions—of hypotheses, in many of which, parts only of the truth appear, the rest being either kept entirely out of view, or hid under an accumulation of loose analogies and inconsequent argument, or buried in heaps of unmeaning verbiage.

135. i. OPINIONS AS TO THE NATURE OF INFLAMMATION.—*A.* Inflammation was very generally attributed to vitiated states of the fluids, until VAN HELMONT ascribed it to an irritation which attracted the blood in a greater quantity than natural into the capillary vessels, the irritation arising from an affection of the *archæus* or vital principle. WILLIS, notwithstanding his espousal of the chemical doctrine of the blood, attributed more to the local irritation of VAN HELMONT, in the production of inflammation, than to the morbid condition of this fluid. Towards the close of the seventeenth century, several theories of inflammation, and of disease in general, were promulgated. The followers of DES CARTES imputed inflammatory action to a fermentation excited by the æthereal fluid which they supposed the blood to contain, and which DES CARTES substituted for the *gas** of VAN HELMONT. The opinions of SYLVIUS were merely modifications of those of the two pathologists just named, and an accommodation of them to the chemical doctrines of the day, acidity of the fluids performing an important part in this theory. LE MORT, SCHNELLER (*Theoriæ Mechanicæ Delineatio,* 8vo. Leyd., 1705), and others adopted the mechanical parts of the doctrines of DES CARTES, and associated them with certain chemical hypotheses not much more deserving of notice. They imputed inflammation to irritation caused by the æthereal particles of the fluids without any reference to other changes. The partial rays of light furnished by the rising of chemical science in Europe were soon employed to explain morbid actions; but they led, especially at first, to little more than to modifications of the doctrines previously adopted, and particularly of the humoral pathology, and never disclosed results deserving of lasting attention.†

* Carbonic acid and hydrogenous gases were partially known to VAN HELMONT, and this imperfect knowledge of gaseous fluids became the basis of several of his pathological views.

† The Dutch physicians, at the end of the seventeenth

136. Pitcairn, the master of Boerhaave, first opposed the chemical pathology then very generally received, and applied the mathematical doctrines promulgated in Italy by Borelli, Sanctorius, and Bellini, and still more widely disseminated by the classical work of Donzellini (*De Usu Mathemat. in Arte Medica: in Guilielmini Opera*, 4to. Genev., 1719, t. ii., p. 516), to the pathology of inflammation. To those acquainted with the physiological and pathological views of Des Cartes, the mathematical doctrines of the Italian physicians will appear as a very obvious and easy application of mathematics to the mechanical parts of the pathology, of which this philosopher may be said to have been the founder. Although numerous modifications of the theory of inflammation were proposed by writers of the mathematical school, yet they may be generally referred to an *error loci*, or to the obstruction which they supposed to be occasioned by the passage of the larger-sized globules of the blood into a smaller series of capillaries, intervening between the arteries and veins,* than are destined to receive them.

137. Boerhaave proposed a theory, which, if it was not altogether original, was, at least, an important modification of that of Pitcairn, and of the mathematical school. He supposed that the blood itself became more viscid, causing a *lentor* in its circulation through the several orders of capillary vessels, and an excessive engorgement of them; an increased action of the larger vessels, and flow of blood in them, taking place to overcome the resistance and congestion. The close resemblance of this hypothesis to others much more recently proposed is very obvious. That the action of the larger arteries should be increased, where an obstruction to the circulation through the capillaries exists, may readily be conceded; but that the afflux of blood can be increased, and obstruction at the same time exist, is a contradiction in terms. In one essential point connected with the theory of inflammation, Boerhaave differed altogether from Pitcairn. The former supposed that a constriction of the capillaries caused a congestion of blood and slower rate of circulation, while the latter considered that an increased diameter of the vessels had this effect. The great defects in the opinions of these physicians, independently of their incorrect views as to the conformation of the capillaries, and as to the constitution of the blood and blood globules, were their entirely leaving out of consideration the power exerted by the organic nervous or vital influence upon the vessels, and upon the circulation through them; and their being unaware of the fact, that both constricted and enlarged capillaries, or other vessels, may have the circulation through them either accelerated or retarded, according to the state of that influence by which the capillaries, and tissues in which they ramify, are actuated.

138. While the mathematical theory of inflammation and disease was evidently supported by, if it did not originate in, the philosophy of Newton, and was the first manifestation of the comparatively modern doctrines of solidism, the views of Hoffmann were more referrible to the system of Leibnitz, and a more complete adoption of the influence of the soft solids in the production of morbid actions. According to this celebrated pathologist, inflammation proceeds from spasm of the smaller vessels, which suspends or impedes the circulation in one part, and determines it inordinately to others, red blood being thereby propelled into capillaries, which in other circumstances admit only the serous portion of it, pain, swelling, and heat resulting therefrom. This theory soon found supporters; and, notwithstanding the already promulgated doctrines of his contemporary and colleague Stahl, these soon became numerous. While the doctrines of Stahl and Hoffmann were dividing the schools of Germany, and especially that of Halle, where they were taught by these celebrated professors, the opinions of the mathematical pathologists and of Boerhaave were predominant in this country and in Scotland, until the lectures and writings of the elder Monro, of Whytt, and of Cullen attracted notice.

139. The medical doctrines advanced in Germany at the close of the seventeenth, and at the commencement of the eighteenth centuries, had more or less reference to the most generally received metaphysical views. The relations already noticed between the doctrines of inflammation hitherto adopted and the pathology of Des Cartes existed chiefly in respect of their more mechanical parts; but the psychological opinions of Des Cartes, and of his successor Malebranche, were not made the basis of a system of pathology until Stahl adopted them as such at a very early period of life. Perrault* had previously demonstrated the influ-

century, were among the chief writers on Pathology, and, consequently, on Inflammation; and the schools of medicine in Holland were acquiring a reputation, which rose with the commercial prosperity of that country. But it is not altogether uninteresting to remark how many of the medical writers in it, about this time, adapted their pathological views, as well as their practical precepts, to the promotion of the traffic of the people. The foreign trade of Holland, rising upon the decay of that of Portugal, Spain, Venice, and Genoa, furnished numerous articles of luxury, not only to the Low Countries, but also to all Germany and the East of Europe. Many of the medical writers of the country brought them into general use; and, whether they imputed inflammation and other diseases to inspissation, or to acidity, or to alcalinity, or even to effervescence of the circulating fluids, still tea, tobacco, coffee, and opium, in extraordinary quantities, were not only the chief remedies, but also the principal prophylactics recommended by them.

* The mathematical school boasts of a numerous list of names eminent not only in medical, but also in mathematical science and in art—of Guilielmini, Michelotti, Bernouilli, Baglivi, Perrault, Chirac, Quesnay, Hales, Mead, Sauvages, and others; and furnishes many splendid examples of the dignity, as well as of the aid, which general science has imparted to the study and practice of medicine. The mathematical doctrine of inflammation was founded on the belief that the globules of the blood consisted of various sizes, and that the red globule was formed of six serous globules, and each serous of six lymphatic globules; three orders of capillary vessels, suited to the conveyance of these globules, existing between the arteries and veins. The obstruction caused by the passage of red globules into the wrong order of vessels constituted what they termed an *error loci*, and the cause of inflammation. While the Cartesians insisted much on the various forms of the globules and pores, the mathematicians contended chiefly for the different sizes of the globules and capillaries.

* Perrault commenced his magnificent career as a physician, and soon acquired by his writings the first eminence as a physiologist, naturalist, painter, sculptor, mechanist, and architect; in which last character he is best known, especially as the architect of the beautiful facade of the Louvre. He translated and illustrated Vitruvius with splendid drawings and engravings; wrote an extensive work, in two folio volumes, on the Natural History of Animals; published numerous Essays on Physiology and Physics; and at his death left for publication a collection of recently invented and useful machines. All his writings

ence of mind upon all the bodily functions; but Stahl had reference to this influence in the production, not merely of inflammation, but also of all diseases, notwithstanding the objections of Gassendi, urged against the physiology of Des Cartes, that the direct influence of the mind was limited to the brain and the organs of sense and volition.

140. The doctrines of Stahl and Hoffmann continued for many years to divide medical opinion, notwithstanding the efforts of Kaauw Boerhaave in behalf of the views of his more celebrated uncle, and his endeavours to connect them with the system of Hoffmann. In this country the opinions of Hoffmann, according to the explanation and modifications of them attempted by Cullen, became most generally adopted, particularly with reference to inflammatory diseases, although the able writings of Whytt strictly belonged to the school of Stahl. Of all the successors of Boerhaave, Gorter most strenuously insisted upon the fact, that inflammation does not consist of congestion of the diseased part, but of an irritation affecting the vital condition of the vessels, and the circulation in them. The influence of irritants upon the state of vital action was, however, first contended for by Glisson; but to Gorter and Gaubius belongs the credit of having more fully illustrated it, and developed the laws of excitement, thereby furnishing a basis for the doctrines of Brown and Darwin at a much more recent period.

141. While the doctrines of Boerhaave, Stahl, and Hoffmann were dividing medical opinion, and at a time when the views of Hoffmann were gaining the ascendency in their more general adoption, Haller first published his opinions on *irritability*. He afterward developed them more fully, and referred this property to the organization of the muscular fibre, but was opposed by Whytt, Lorry, and Gaubius, as to its precise source; and, contrary to the opinion of the former, who referred irritability to cerebro-spinal nervous influence, he carefully distinguished it from, and endeavoured to prove its independence of this influence. He disputed the doctrine of this pathologist, that exaltation of irritability determines the circulating fluids to inflamed parts; yet there is no doubt, as Whytt observes, that the "heat, redness, and inflammation, brought on the skin by blisters and sinapisms, are not owing to any increase of the force of the heart, or of the *momentum* of the blood in the larger vessels—though this is often an effect of their application—but merely to the action of these irritating substances on the cutaneous vessels, whereby the motion of the fluids in them is greatly augmented." Haller believed that the accumulation of blood in the capillaries was owing chiefly to constriction of the small veins, and that the derivation of this fluid to any particular part should be attributed to the removal of the resistance furnished by the state of the capillaries and veins. He agreed with Whytt that obstruction cannot of itself produce inflammation, and insisted upon extravasation of the red particles as constituting a part of the redness observed in some inflamed tissues. Winter, nearly at the same time as Haller, published views as to irritability similar to those of this celebrated pathologist; and Verschuir greatly extended, and, at the same time, modified the doctrines of the latter, especially as to irritability of the arteries and capillaries in warm and cold blooded animals. The chief sources of error in the observations of those eminent writers are their having viewed the fibrous coat of the arteries as muscular; their imputing the properties of muscular tissues, not only to these vessels, but also to the capillaries, which are unprovided with this coat; and their confounding not only organic or insensible contractility and vital expansion, but also the elasticity of fibrous tissues, with the irritability or sensible contractility of muscular fibres. The intimate structure of parts, and the kind and degree of vital manifestation proper to each, were imperfectly known to them, and indeed to many of their successors, and were insufficiently distinguished one from another, and hence were confounded in such a manner as to vitiate most of their pathological inferences.

142. The chief modification in the theory of Hoffmann, suggested by Cullen, was his belief in a *phlogistic diathesis*, predisposing to and occasioned by local inflammation, this diathesis consisting in an increased contractility of the fibres of the whole arterial system. He objected to the opinion of Boerhaave, as to congestion of the vessels being a part of the inflammatory state, and contended that the obstruction is owing to spasm, which indirectly causes an increased afflux of blood to the affected part. "A spasm," he remarks, "of the extreme arteries, supporting an increased action in the course of them, may therefore be considered as the proximate cause of inflammation, at least in all cases not arising from direct stimuli applied; and even in this case the stimuli may be supposed to produce a spasm of the extreme vessels."

143. Some pathologists, towards the close of the last century, and in still more recent times, being unable to reconcile the idea of increased action with the enlargement of the capillaries, and the swelling constituting inflammation, believing as they did that increased action must necessarily be productive of contraction, had recourse to the supposition that the disease depended upon *relaxation and diminished action of the extreme vessels*; others, again, ascribed inflammation to *increased action of these vessels*; and thus pathologists were divided into two opposing parties. The chief fallacies common to both were their having taken it for granted that capillary and arterial vessels possess a muscular structure performing the function of muscular parts; and that an increased action, according to the one party, and a diminished action, according to the other, constitutes the principal, and, indeed, the only morbid condition throughout the disease. These opposite doctrines have been so warmly discussed in recent times, each party endeavouring to support their own views by experiments, that it becomes necessary to consider them somewhat in detail.

144. *B.* The *doctrine of relaxation*, or diminished action of the capillaries in inflammation, the blood becoming nearly stagnant in the dilated vessels, originated with Vacca Berling-

abound in originality; for, in his very diversified studies, he was guided chiefly by observation and his own genius.

hieri (*De Inflam. Morbosæ Naturâ, Causis, Effectibus*, &c., Flor., 1765), and was promulgated in this country by Mr. Allen, who modified the opinion of Vacca, and contended that the action of the arteries is increased, a larger quantity of blood being thereby propelled into the weakened capillaries than they can transmit. According to this theory, the exciting causes, even when they stimulate the part, produce not an increased action of the capillaries, but only excite the larger arteries supplying the inflamed structures, and ultimately quicken the contractions of the heart. The effect of this is, that a larger quantity of blood than usual is propelled into the weakened capillaries, and especially the colourless branches; and upon this unusual quantity the weakened vessels are unable to react, so as to carry on the circulation, stagnation and obstruction in them being the result. Dr. Wilson Philip modified the doctrine of Vacca in a different manner; and, while he maintained that the extreme vessels are primarily weakened, he contended that the action of the larger arteries supplying these vessels is consecutively increased, the differences between active and passive inflammations depending, according to him, upon the degree in which the arteries supplying the blood to the inflamed part are excited. In farther illustration of his views, by experiments and microscopic observation, Dr. Philip remarks that "the motion of the blood is retarded in the capillaries, in consequence of the debility induced in them; an unusual obstacle is thus opposed to its motion in the arteries preceding them in the course of the circulation, which are thus excited to increased action." In this statement of his views one difficulty presents itself: How comes the debility of the capillaries, causing retardation of the motion of the blood through them, to follow directly upon the application of stimuli? Dr. Philip infers the debility from the apparent retardation of the circulation of the red globules in his microscopic experiments; and, having inferred the debility, concludes that the apparent stagnation must really exist. Thus reasoning in a circle, he states the above doctrine as its result. The difficulty here adverted to seems not to have escaped Dr. Hastings, who appeared in support of the opinions of Dr. W. Philip. The experiments of Dr. J. Thomson, stated in his excellent work on Inflammation, had demonstrated certain points subversive of the doctrine of Dr. Philip, and of these Dr. Hastings took some notice. Inferring, with his master, or, more correctly, with Vacca Berlinghieri, that "inflammation consists of a weakened action of the capillaries, by which the equilibrium between the larger and smaller vessels is destroyed, and the latter become distended," he, nevertheless, is compelled to admit that increased action, or temporary excitement of the capillaries, may precede the debility constituting inflammation. "Certain stimuli," he remarks, "applied to living parts, produce an increased velocity of the blood's motion, and a contraction of the vessels. During this state of excitement, the part affected is so far from having anything like the appearance of inflammation, that the size of the vessels is diminished and the part paler. But if the stimulus be long continued or increased in power, the small vessels, which, in the natural state, admit only of one series of globules, become so dilated as to allow an accumulation of a much less fluid and redder blood in them, which loses its globular appearance, and moves much more slowly than that which previously passed through the vessels. The part now appears inflamed. If the stimulus be removed the blood-vessels do not soon regain their original state; time is necessary to allow them to recover their contractile power, so as to prevent the impetus with which the blood is propelled by the heart and larger arteries from keeping up the dilated state of the capillaries." Dr. Hastings farther contends that, when acrid substances produce inflammation, debility of the capillaries takes place without previous excitement, the blood becoming very red, circulating very slowly, and stagnating in some of the branches. As Mr. Morgan remarks, the hypothesis of weakened action of the capillaries, and slower motion of the blood in them, has been the most generally adopted of the recent theories of inflammation, because it admits of a more easy demonstration with the microscope.

145. All the supporters of this doctrine err in attributing little or no share in the inflammatory act to direct excitement of the capillaries—in believing that excitement must necessarily be attended by constriction of these vessels, and that dilatation of them is incompatible with increased vital action—and in dismissing from their consideration the other morbid acts contributing to the production of the disease in its various stages and forms. That the extreme capillaries are weakened, dilated, and congested, and even that the blood stagnates in them at a more or less advanced period of sthenic inflammations, and at a very early period of the asthenic forms, have been stated above; but this condition is only one of several constituting the disease, which, in no instance and in no stage depends upon a singleness of event, as contended for by the espousers of this and the opposite theory.

146. *C.* The *doctrine of increased action* of the vessels in an inflamed part may be attributed, as stated above (§ 140), to Gorter and Gaubius, if not to Glisson. They considered that inflammation was the consequence of *irritation*, which increases the vital action of the vessels and propels the coloured blood into the colourless capillaries. Mr. J. Hunter believed that inflammation is an increased action of the vessels of a part, attended by accelerated circulation; but he erred in supposing the vessels to be muscular, and the error vitiates more or less all his reasoning on the nature of the disease. Mr. Morgan states that Mr. Hunter's "opinion of the nature of inflammatory action is not clearly stated, nor does it appear from his writings that he had ever made any experiments in order to ascertain the state of the minute vessels." Mr. Hunter, however, has stated his opinion of the nature of inflammation in several places, even in the same chapter, and to the purport just given. At another place he observes, "the very first act of the vessels, where the stimulus which excites inflammation is applied, is, I believe, exactly similar to a blush. It is simply an increase or distention beyond their natural size;" and again, "what-

ever purpose the increase of the size of the vessels may answer, we must suppose that it allows a greater quantity of blood to pass through the inflamed part than in the natural state, which supposition is supported by many other observations." Indeed, the whole of the section on the "*Action of the Vessels in Inflammation*" contains a very detailed and distinct account of his views as to the nature of the disease. As to the assertion that Mr. Hunter never made experiments to determine the nature of inflammation, the reader has only to refer to the section just mentioned, where he will find the details of observations and experiments made upon warm-blooded animals—not frogs, and other animals unsuited to the satisfactory elucidation of the subject—proving the justness of his views as respects certain states and stages of the disease.

147. The increased action of the capillaries in inflammation has been advocated by Dr. Parry, partly by Dr. J. Thomson, and by Mr. James; yet most of the same fallacies which vitiate the doctrine of the opposite party may be urged against the majority of those who contend for the truth of this, and especially their belief in the irritability of these vessels. Indeed, this phrase has been employed by many without attaching any precise meaning to it, and without being aware that, if by *increased action* they meant *increased contraction*, or even an increased power of alternate relaxation and contraction, as in muscular tissues, the circulation of the inflamed part would be altered by it very differently from what is actually observed. The circulation, in health, through the capillary vessels does not require the aid of any action on their part; for the contractions and dilatations of the heart, and the elasticity of the larger arteries, are quite sufficient for the transmission of the blood, not only in the capillaries, but also in the veins. Agents which change the tonicity of the tissues will necessarily affect that of the extreme vessels, and, consequently, the state of circulation through them; but such agents will seldom give rise to inflammation, unless by a succession of changes, of which alteration of the state of circulation, whether increased or diminished, is only a part, as I shall endeavour to show hereafter.

148. The experiments which have been planned and performed with a view of establishing the truth of either of these doctrines of inflammation, have been altogether vitiated by the circumstance of the chemical action: 1st, upon the tissues; 2dly, upon the capillaries; and, 3dly, upon the blood of the agents employed in these experiments having been entirely overlooked. But this is not all; the physiological or vital action of these agents has been neglected, equally with the chemical action, and even with the changes they produce upon dead animal matter. These experiments abound, moreover, in other sources of fallacy, attributable to the means and aids used in ascertaining the effects, and to the subjects upon which they have been performed. Can it be believed that all these circumstances—any one of which is sufficient to overturn the conclusions drawn from these experiments—have been neglected? Instead of observing closely the changes taking place in tissues actually inflamed, and the succession of these changes in the different stages and forms of inflammation, as affecting different structures, substances producing both vital and chemical alterations in the tissues, blood-vessels, and blood itself, have been applied to parts, and the effects directly and remotely produced by them have been described as identical with inflammation, and made the basis of the prevailing doctrines of the disease. Before any inference, or even the smallest fraction of information, can be derived from the experiments paraded by many of the writers on this branch of pathology, it is necessary to bear in mind that acids, or alkalies, or alcohol, or turpentine, or neutral salts, when applied to a vascular tissue, produce effects which are not identical with any of the usual forms of inflammation. Acids affect the nervous influence of the part; constringe, corrugate, or cornufy the tissues and capillaries; change the colour and state of the blood in the extreme vessels, and arrest the circulation in them; and, if inflammatory appearances supervene, much of the primary changes will still continue to modify its characters. Alkalies produce opposite effects; they weaken the vital cohesion of the tissues, partially dissolve them and combine with them, redden and otherwise affect the blood, and, according to their strength, influence the form and termination of the morbid changes they produce in the part. Turpentine, and, in a less degree, alcohol, in their primary action, change the state of nervous power, constringe the capillaries and tissues, and retard the circulation in them; and neutral salts variously affect the vitality, the structure, the circulation, and the blood of a part, according to their individual constitution. When any one of the numerous substances which may produce inflammation is applied to a living tissue, the effects are not limited to the spot with which it is in actual contact. The impression extends, and a modified, or even opposite action, may be superinduced in surrounding parts. If the substance be injurious, or subversive of vital power in the part, more or less resistance is offered to the extension of the mischief. The injury affects the state of organic nervous power; and the irritation or consequent reaction of this power, and its influence upon the surrounding vessels and blood, give rise to inflammatory action, either in the seat of injury or around it. If a living membranous tissue be pricked with a red-hot needle, the following effects will result; but these effects, although inflammatory in many respects, are not to be viewed as identical with idiopathic inflammation, as they have been by some writers, and for the reasons which will be stated. The red-hot needle will produce much pain, attended by the immediate constriction or corrugation of the tissues and capillaries; the blood being driven from the part immediately surrounding the puncture, the red globules undergoing a change in colour, and becoming stagnant in and adhering to the vessels adjoining the punctured spot. This is the immediate effect; but in a short time — varying, however, with circumstances—the punctured spot either becomes dark or black at a central point, around which the vessels dilate, the injury having either destroyed their continuity or obstructed them. The increased vascularity, which soon takes place around the injured spot, now becomes

inflammatory, and is partly owing to obstruction in this spot, and to the consequent development of the surrounding capillaries, so as to carry on the circulation. But the affection, by the injury of the organic nervous influence of the part, so influences the state of the extreme vessels as to produce the chief of the phenomena. Now the early part of the changes here observed are not to be viewed as identical with idiopathic inflammation, although illustrative of the production of inflammatory action by certain injuries; for the agent employed cornufies the capillaries, stagnates and changes the blood in them, obstructs their circulation, and severely affects the nervous influence; this last change especially producing, in the extreme vessels of the injured part, consecutive effects, which only are truly inflammatory, particularly in previously healthy constitutions or structures.

149. In order to arrive at anything like a just notion of the nature of inflammation, the phenomena constituting it should be closely examined from the commencement, whether arising spontaneously, or produced by an irritant or excitant. But the phenomena observed in a single tissue, or in a particular form of the disease, are not to be viewed as constituting alone its characters in all stages, forms, and circumstances. The essential characters, as well as the subordinate phenomena, of inflammation, vary in all the states and stages of it; they are continually changing with their duration and the nature of the causes which produced them, and according to the temperament, habit of body, diathesis, and constitutional powers of the patient. So diversified do they thus become, that it would be endless, if not impossible, to describe them in all their conditions, periods, and consequences. The most prominent pathological states can only be mentioned; the descriptions already given, and the observation or experience of the reader, will supply deficiencies which must still remain, even after the most minute details.

150. ii. Pathology of Inflammation. — *A. Of the Nature of the Sthenic Forms.—a. The organic nervous tissue is primarily affected in the seat of inflammations of all kinds.* I have already contended that inflammation, in its more *sthenic forms*, is a result of a *morbidly* excited state of the organic nervous tissue surrounding the extreme vessels or capillaries of the affected part, or a derangement from an unnaturally exalted condition of these nerves, on which the function of these vessels, and, indeed, of the whole vascular system, have been shown to depend. One of the chief inquiries concerning the nature* and pathological relations of inflammation is, whether this excited or exalted state of the organic nervous tissue is one of simple excitement or not, whether the functions of the nervous tissue be merely increased above the healthy pitch, or whether or not they are also otherwise changed. I have stated them to be morbidly or unnaturally excited, thereby indicating that they are increased differently from what we observe in a healthy part from the application of a stimulus, as respects both the *duration* and the *kind* of action they occasion.

151. The *duration* of the healthy exalted action consequent upon simple excitement, mental or physical, is generally brief—the effects soon subsiding with the removal of the cause —because the nervous influence exerted on the capillaries is simply increased, without the mode or habitude of this influence being changed in kind. When, however, an irritant, stimulus, or other cause operates upon a part so as to change the mode of organic nervous influence endowing it and its capillaries, the consequent vascular excitement or action is not only of longer duration, but is also altered in kind: it becomes truly morbid; and it either subsides gradually before the conservative powers of this influence as exerted throughout the frame, or undergoes a succession of changes, until it terminates in one or other of the ways described, as usually observed in sthenic inflammations.

152. That the first change occasioned by the exciting cause takes place in the organic nervous influence of the part, is proved by the early effect produced by it upon the organic sensibility, and on the functions more immediately dependant upon this influence. The uneasy sensation of inflammation, in its various states and modes, is to be ascribed (§ 8) to the morbid impression made on the organic or ganglial nervous tissue, and is to be viewed as the sensible expression of the consequent change in the condition of the influence exerted by this tissue in the affected part—as indicating a morbid state of this portion of the nervous system, producing and attended by deranged action of the capillaries in the affected organ, and often exciting or otherwise disturbing the sensibility and functions of the cerebro-spinal nerves, with the terminations of which the former becomes associated in many of the textures. The pain or uneasy sensation attending the changes in the organic nervous tissue, which affect the state of the capillary circulation, so as to give rise to inflammation, is, as shown above (§ 82), very distinct from the morbid sensibility often manifested by the cerebro-spinal ramifications, as in the different forms of neuralgia and of spasmodic affection; and, although the latter is much more acute and violent than the former, yet it never gives rise to much vascular disorder. Excitement of the cerebro-spinal nerves has but little immediate influence upon the capillary circulation, except-

* The views which I now proceed to state were published by me first, as already noticed, in 1815; on several occasions during the years 1821 and 1822, in the *Medical and Physical Journal*, and in the *London Medical Repository*; and still more fully in my *Appendix* to M. Richerand's *Elements of Physiology*, published in 1824. They were the result of a close investigation of the subject; and if the reader will refer to the section on *Inflammation*, which I added to the last of the works just mentioned, and afterward to that of Kaltenbrunner, published in 1826, he will find my doctrine and observations fully confirmed by his researches, as well as by those of M. Gendrin, also published in 1826. A very large reprint of my *Appendix*, containing the same section on *Inflammation*, without any alteration or addition, appeared in 1829. In 1835, and at still later periods, treatises and essays on Inflammation have been published by several writers, in which the principal parts of my doctrine have been adopted, but without any reference to the original propounder of them. Of this I thought it not worth while to take any notice at the time, as I was about having it in my power to do myself full justice, and to an extent, in respect of circulation, infinitely beyond what could be reached by the works in question. It is very probable that the opinions first brought forward by me have been subsequently suggested to these writers, without having ever perused any of my writings on the subject; yet one of the works only, and that one containing a full exposition of my doctrine, has been circulated to the extent of several thousands.

ing that of the countenance, as in the act of blushing; and then this is only temporary. Whatever influence these nerves may possess over the circulation is only produced through the medium of the organic or ganglial nervous tissue distributed to the capillaries and structures generally. This provision is important as respects the preservation of the healthy functions of parts; for if the vascular system were *directly* under the dominion of the cerebro-spinal nervous system, all the functions of circulation, secretion, nutrition, &c., which are subjected to the organic nervous influence, would be liable to continual derangement from the various impulses of the will and the passions. From this it will appear manifest that changes in the cerebro-spinal nerves of an organ, or part, can have but little effect in the production of inflammation, while alterations of the organic nervous influence or sensibility are almost, if not altogether, necessary to its existence. In cases of severe injury to the spinal chord causing paraplegia, the lower extremities are not more liable to inflammation than in health.

153. *b. The causes being of an exciting nature, the primary effect on the organic nervous influence and on the capillary circulation will partly or chiefly consist of excitement—the sthenic states of inflammation generally resulting.*—Whenever the causes of inflammation, either directly or indirectly, are of an exciting kind, whenever excitement is even one only of the effects produced by them, we must admit that the vital influence of the organic nervous tissue of the part upon which these causes act will be increased for a time by them; the excitement being, however, modified by their nature. The organic nervous tissue supplying the capillary vessels of the affected organ will especially manifest this effect in the altered action of these vessels. Whenever the organic nervous influence is locally increased, the vital actions of the associated capillary vessels are also augmented—the diameter of these vessels becoming enlarged, and a larger column of blood circulating in them with increased velocity. This is evinced during excitation of secreting surfaces and of erectile parts, and by the enlargement of the nerves and blood-vessels of the uterus after impregnation. That the principal part of the more direct effects produced by the application of stimulants to living structures consists of exaltation or excitement of the organic nervous tissue, causing increased action of the vessels, is proved also by the phenomena observed to follow such applications to organs or parts supplied either chiefly or only by organic or ganglial nerves. Now, if we admit, what cannot be disproved, that excitement of the organic nervous influence of a part increases the vascular activity and circulation of that part, it must necessarily follow that, whenever an increase in degree forms a part of the change induced in this influence by the causes of inflammation, a proportionate augmentation of the size of the capillaries will take place—an active expansion, or turgescence, of the extreme vessels will result, and give rise to states of inflammation of a more or less sthenic character, according to concomitant circumstances, either extrinsic or intrinsic, in respect of the person affected. But that the causes of sthenic inflammations do not merely excite the susceptible nervous tissue, and, consequently, vascular action, but also otherwise change the former, and consecutively the latter, is proved by the duration of the resulting effects and by the succession of alterations, both local and general, as above described.

154. *c. In sthenic inflammations, organic nervous influence and vascular action are not only primarily increased, but also otherwise changed.*—In the early stage of all inflammations there is every reason to suppose that the organic nervous influence of the capillaries and inflamed part is not merely changed in degree, but that it is also modified in kind; and that the differences existing, not only in the forms and varieties, but also in the stages of inflammation, depend upon the extent and combination of these changes—an excited, and, at the same time, a modified kind of influence, especially characterizing the sthenic forms of this disease, the combination of impaired and altered influence with excited action constituting the more active states of the asthenic varieties. The irritant or other cause of inflammation seems to impress the organic or vital influence, or the ganglial nervous tissue of the part, or of the system more generally, in such a manner as to prevent this influence and the vascular disorder produced by it from returning to the natural state, at least for a considerable time. Morbidly excited action is thus induced in the capillaries of a part, particularly in the sthenic forms of the disease, and is succeeded by other changes. When the exciting cause alters the organic nervous influence in other modes, the capillaries are co-ordinately affected. If this influence is depressed as well as otherwise altered, locally or generally, either by the operation of the cause or by pre-existing disorder, a state of action characterized by deficient power is the result. The specific forms which inflammation assumes when arising from certain causes, particularly from infection or inoculation, depends upon the mode or nature of the morbid impression made upon the organic nervous tissue of the part, especially that distributed upon or interwoven with the capillaries. The causes may act by their continued presence; thus, irritating bodies, or the lesions of structure produced by chemical agents or by injury, may prove sources of irritation to the nerves and capillaries of a part; but more frequently the exciting causes change by the impression made at first by them, the degree, mode, or state of influence exerted by the organic nervous tissue upon the capillaries and smaller vessels, and upon the fluid circulating in them; the resulting morbid action presenting corresponding and peculiar characters in respect of kind, degree, and power or tone. This is more remarkable in the more specific forms of inflammation, either produced by certain poisonous agents or attending some constitutional maladies.

155. In experiments upon living tissues, the effects produced by various stimulants and astringents have, in some respects, been misinterpreted by the experimenters; and the slight constriction of the capillaries that directly follows the application of such substances, and before the dilatation which subsequently occurs, has been viewed as the first part of the inflam-

matory act. But this effect depends upon the action of these substances, particularly of turpentine, alcohol, the salts, and many others, upon the vital contractility of the tissues and extreme vessels. The instant effect of these is more or less constriction of the capillaries; but this very soon ceases, the natural state, or expansion beyond it, soon following. When the substance employed is of an irritating nature, without any astringent property, an enlargement of the capillaries is the next phenomenon to follow the impression made by it upon the organic nervous tissues, this impression being frequently rendered instantly and acutely sensible. In observations or experiments made upon the living tissues, care should be taken to distinguish between the effects produced, 1st, upon the organic sensibility; 2d, upon the organic contractility; and, 3d, upon the physical properties of the tissues, upon their cohesion, elasticity, &c., or upon the properties which animal substances continue to manifest some time after death. The *first* of these ceases instantly with dissolution; the *second* remains for a short time afterward, but is soon exhausted by strong stimuli; and the *third* continue much longer, but gradually disappear with the supervention of decomposition, yet admit of being more or less preserved and somewhat modified by various substances of an astringent and antiseptic nature. In the investigation of the nature of the changes in living structures, usually called inflammatory, the intimate relation existing between these changes and the causes which induced them should not be overlooked. The mode of operation of the causes, especially with reference to the vital and physical properties just enumerated, and to the local and general circulation, ought to be strictly regarded; and the manner in which the results may be modified by constitutional predisposition should be taken into account.

156. *d. The state of circulation in the early stages of sthenic inflammations.*—The primary affection of the organic nervous tissue having been shown to be one of *morbid excitement in the sthenic forms of inflammation*, and the effects of this excitement to be *turgescence, enlargement, or active expansion of the capillaries*, it next remains to inquire as to *the state of the circulation in the enlarged vessels*. This topic has been much discussed, for observations of the current of blood in the capillaries are liable to error; and, besides, the flow of blood may be retarded at a single point, and greatly accelerated at others, particularly when inflammation is produced by mechanical or chemical agents. The state of circulation also undergoes a succession of changes, as will be hereafter shown, with the progress of the disease. It will not be denied that the organic or ganglial nervous tissue exerts a manifest influence, not only upon the capillary circulation, but also upon the blood itself; and that the secreting and other organic functions are under the dominion of this part of the nervous system. It consequently follows that excitement, depression, or other affections of this influence will produce co-ordinate changes, not only in the capillaries and related vessels of a part, but also in the state of circulation and in the blood in them. During excitement of the organic nervous functions of an organ, the vessels experience not only an expansion, but also an increase of tone, a vital turgescence. The capillaries, although increased in diameter, still retain the power of reacting sensibly upon the blood propelled into them, so as to preserve, if not to accelerate, the rapidity of the currents passing through them. The necessary result of these states is an increased flow of blood, and a rise of temperature, and these effects continue until the excitement is exhausted, varying, however, in feature as well as in continuance, and more especially in the associated phenomena and consequences, with the mode or kind of excitement directly resulting from its cause.

157. When the propelling power of the heart and the tonicity of the larger arteries give rise to an increased *vis à tergo*, and particularly when the expansion of the extreme vessels is such as to allow a portion of their contents to escape through the delicate or imperfect canals in which they terminate, or when an obstacle is opposed to the return of the blood through the veins, a portion of the red particles escapes with the serum into the inflamed tissue, generally at minute or distinct points. This is observed especially when the tone of the capillaries in an inflamed part is exhausted, either by the nature of the exciting cause or by the previous excessive excitement, before the increased action of the heart has subsided.

158. *e. Of the development of new vessels in inflamed parts.*—It is not only the vital turgescence or expansion of the capillaries, so that those which could not admit the coloured globules of the blood in the healthy state readily admit them in an inflamed part, but also the development of new vessels that is often observed. But this latter event takes place chiefly in serous membranes, and especially in albuminous exudations from the inflamed surface. It possibly may also occur in other parts, to a more limited extent, although it does not admit of so obvious a demonstration as in these. It can only occur in the various grades of sthenic inflammation, and it fully evinces that, although truly morbid in its nature, this form of the disease is characterized by vital activity, and by a deranged increase of the formative process in the affected part. In asthenic inflammations, however much capillary canals may be enlarged so as to admit a greater column of blood, no new vessels are developed, unless the asthenic be converted into the sthenic state. In the former state of disease, the expansion is the result of impaired vital tone and resistance, both of the capillaries and of the tissues affected; and the organic nervous power of the part and the action of the capillaries upon their contents are incapable of forming either coagulable lymph or new vessels. In the latter state, nervous power and vascular action are capable of producing the one, and often, also, the other.

159. When sthenic inflammation affects serous membranes, the morbid exudation thereby formed on their surfaces is sufficiently consistent to admit of the extension or growth of new vessels from those which had become enlarged in the early stages of the inflammatory act, and to give them support until they acquire considerable development. But when the asthenic disease implicates these membranes, the secretion from their surfaces is too watery or

serous to furnish consistent canals or channels in which the contents of the capillaries may be conveyed beyond those which are morbidly enlarged, without commingling with the rest of the effused matter. In cases where new vessels form, the exuded lymph or albumen into which they run is not only, to a certain extent, consistent, but also somewhat scanty, or, at least, not very abundant; but in cases where they cannot be formed, the fluid effused is generally both serous and copious.

160. The production of new vessels in parts sthenically inflamed, particularly in exudations of lymph, is observed chiefly in young persons, and especially in those who are in the course of development. Occasionally the new vessels are numerous and distinct, even before the lymph has become at all abundant or consistent. In some very beautiful injected preparations by Mr. KIERNAN, the eminent pathologist, that he kindly showed me, this was most remarkably demonstrated; as well as the fact, which has been controverted by some French pathologists, that the new vessels shoot out from the inflamed surface, if not from those enlarged in the early stage of the inflammatory act. When new vessels form in the fibrinous lymph exuded from serous membranes, they may often be injected, the continuity of these vessels with those of the affected part being thereby clearly shown. Yet the most vascular part of the newly organized false membrane may not be that nearest the seat of inflammation, the new vessels forming several anastomoses, and occasionally becoming enlarged in some places at a distance from the surface whence they were produced.

161. *f. Consecutive changes in the sthenic forms.*—The successive changes taking place in the course of sthenic inflammations are conformable with the laws of the animal economy. The excitement produced in the organic nervous tissue and capillaries of the part is exhausted with a rapidity and to an extent in proportion to its intensity relatively to the powers of the constitution and of the part affected; and as the exhaustion proceeds, the tonicity of the extreme vessels and of the diseased tissue, as well as the vital cohesion of both, is weakened, the circulation through them retarded, and the colour of the blood deepened. The extent to which these changes take place, in connexion with the degree of general vascular action and of constitutional power, fully accounts for the lesions consequent upon sthenic inflammations. When phlegmasia arises from specific causes, the kind of morbid excitement primarily induced by them will, according to their nature, more or less modify these changes, and give rise to certain results in preference to others. We perceive this in the exanthemata and in various inflammatory diseases. The tissue affected will also modify the continuance and mode, as well as the consequences of the morbid excitement. But there can be no doubt that the successive alterations in the inflamed structures are merely consequences of the morbid impressions made by the exciting causes upon the organic nervous tissue, particularly in its connexion with the capillaries; the states of these and the connected vessels, of the circulation through them, of the blood, and of the diseased part, being the effects which may either disappear before the vital resistance of the frame, or terminate in any of the ways described above (§ 39, *et seq.*).

162. *B. Of the Nature of the Asthenic States.*—The remarks which I have just offered more especially refer to the *nature of the more sthenic inflammations*, and it is, therefore, necessary to consider *the circumstances in which the asthenic states differ from these.* It has been shown that these states proceed chiefly from constitutional predisposition, or from previous or associated disorder, or from the nature of the exciting cause. In either case, the organic nervous influence, and, consequently, the tone or vital contractility of the tissues and capillaries in the seat of the disease, are quickly exhausted or readily depressed, and soon become otherwise morbidly affected—effusion, softening, disorganization, or gangrene, taking place with a rapidity in proportion to the primary vital depression, or to consequent exhaustion, and to the nature of the impression made by the exciting cause. In cases of asthenic inflammation, either there has been originally or acquired great debility or deficiency of the organic nervous power, or the assimilating and excreting functions have been long disordered and imperfectly performed, or the exciting cause has been of a powerfully depressing or poisonous nature. Indeed, two, or even all of these circumstances, may be concerned, each more or less, in the production of some one or other of the morbid states of action comprised under the more generic appellation, asthenic inflammation. Owing to one or more of these circumstances, the vital contractility of the capillaries and tissues of the affected part is impaired; vital cohesion is weakened, so as to occasion remarkable softening and friability of the structures; the tone of the extreme vessels is so far lessened as to admit the effusion and percolation through the more yielding tissues of the more serous portions of their contents, sometimes coloured by red particles; the vital resistance of the capillaries, owing to the loss of tone, is insufficient either to resist even the weakened impetus of the blood, or to react upon it so as to carry on the circulation through them and the venous capillaries; and, ultimately, increased effusion, retardation or stagnation of the blood in the minute vessels, and all the consequences shown to result from the asthenic forms of inflammation (§ 70, *et seq.*), take place. Throughout the course of asthenic inflammations, the states of organic nervous influence, of vital action in the extreme vessels, and of the circulation in the affected part are incompatible with the production of coagulable lymph; and hence the effused fluid infiltrates the more soft surrounding tissues, and, owing to its morbid condition, caused by the states of vital action and of the blood, contaminates them, or promotes their disorganization.

163. The *distention* of the capillaries in asthenic inflammations is referable to impaired or lost tone, rather than to an active vital expansion or turgescence similar to that which characterizes the early stages of sthenic inflammations; or, if the latter state exist at first, as it probably does for a very short time, in the less asthenic cases, it soon exhausts itself, and passes into atonic distention, with retarded

circulation. But there is every reason to infer that the current of the blood is impeded or retarded in the capillaries at an early stage, or even from the commencement of many cases of asthenic inflammation, particularly those caused by septic agents or animal poisons, and that the blood soon becomes stagnant in them, the various consequences already noticed appearing according to the intensity and rapidity of the previous changes upon which this has been shown to depend. In proportion, generally, as the circulation is retarded in the extreme vessels, the temperature of the inflamed part sinks, and the colour becomes deep or livid, until a purplish or brown hue is acquired. As soon as these changes take place, disorganization soon follows, and proceeds with a rapidity in proportion to the weakness of vital power and resistance. If the organic nervous energy be aroused or re-enforced by appropriate constitutional and local means, the mischief may be arrested, unless it have already proceeded beyond the powers of restoration, and it may be ultimately remedied, as in the advanced stages of sthenic inflammations. When the asthenic forms are arrested at an advanced stage, they generally assume more or less of the characters of the sthenic condition, reparation taking place as in that form of the disease.

["It seems," says WILLIAMS,* "to be well established that an essential part of inflammation is the production of numerous white globules in the inflamed vessels, and that the obstruction of these vessels is mainly due to the adhesive quality of these globules. The production of these globules must probably be considered as an ultimate fact in the history of inflammation and nutrition; but it may be observed that sometimes it seems to be the direct effect of an irritant acting on the blood-vessels and their contents; in other instances it seems rather to result from determination of blood into previously-congested capillaries. Any circumstances causing continued determination of blood, where congestion is already present, will occasion the production of the white globules, and, consequently, inflammatory obstruction may ensue. The complete obstruction of some capillaries by coagulation takes place in all cases of severe inflammation of the frog's web; but there are slighter kinds of increased vascularity, in which there is no total obstruction, but a continued enlargement of the capillaries and veins, as well as of the arteries. This might be called simple determination of blood; but it differs from that of a transient character in the motion in the capillaries and veins being slower, and in the vast number of white globules seen moving slowly in them. Very probably this kind of process takes place in the lowest forms of inflammation, and an increased nutrition independent of inflammation. Something of the kind is generally seen in the capillary circulation of young frogs.

"Numerous experiments and considerations lead to the conclusion that the most essential character of inflammation consists in an increased motion or determination of blood to the affected part, with a more or less obstructed flow through the part, the force of the increased motion being partly expended in the arterial portion of the dilated capillaries, and partly diverted into the collateral channels so abundantly supplied by the anastomosis of vessels. The obstruction in the vessels of an inflamed part we have found reason to ascribe, in part, to the increased mass in the smaller vessels and to the diminished elasticity of their coats, and in part to the unusual formation of white lymph globules, which adhere to the walls of the tubes and to each other. Of the exciting causes of inflammation, the direct irritants seem to produce obstruction in both these modes; those which act indirectly, on the other hand, in the first instance produce congestion, to which determination of blood being subsequently added, the inflammatory process begins; hence the latter causes, although very common, are not so sure of exciting inflammation as direct irritants are.

"The effect of these changes, essential to inflammation, is to expend much of the circulating force conveyed by the arteries on their capillary terminations; and the enlargement and tortuosity of these capillaries, the production of globules which adhere to their sides, and their total obstruction by the same means, seem to be so many progressive expedients used by nature to direct the force of the circulation to that part of the vessels by which the process of reparation and nutrition is chiefly carried on."

Between the application of an exciting cause and the establishment of that morbid action which goes under the name of inflammation, a certain period, varying in duration, elapses, which has been called the stage of *incubation*. Gradually the blood begins to flow towards the part affected with increased velocity; the capillaries and minute arteries at first contract, and exhibit a diminished caliber, from increased tonicity of their coats; but this slowly vanishes, and the same vessels become distended with blood. This forms the stage of *simple vascular excitement*, or *vital turgescence* of some physiologists, which may speedily subside on the withdrawal of the exciting cause; but if the cause persists, or is of a severe character, a stage of *active congestion* follows, which reacts upon the general circulation, in consequence of which still larger quantities of blood are sent into the affected part, and the minute vessels become over-distended, and give way beneath their burden. The blood now begins to grow more viscid, the lymph globules to increase, becoming unusually adhesive to each other and to the walls of the vessel, thus leading to obstruction. The circulation is, probably, also retarded in consequence of an increase of vital attraction between the blood and the surrounding parenchyma. Exudation of serum and liquor sanguinis becomes more copious; the fibrin of the blood is increased, not only in quantity, but in plasticity, or its tendency to become organized. The natural function of the part is at first exalted, then prevented; from the effusion of fibrin and coagulable lymph the structure of the part becomes changed, and, perhaps, to that extent as to be incompatible with future integrity of function. This state of things may also subside on the withdrawal of the cause, or it may advance to *true inflammation*, where the over-distention of the capillary vessels is fully es-

* Principles of Medicine. Philadelphia, 1844.

tablished, and their contractile power annihilated or suspended. The blood either slowly circulates through the part or actually stagnates; coloured and colourless corpuscles distend the minute vessels, for causes already assigned; the altered liquor sanguinis is exuded in profusion; the coats of the capillaries yield, and blood is extravasated. In consequence of extravascular degeneration of the fibrinous effusion, or from a secretive elaboration of it ere it has left the vessels, pus is formed and extravasated, and thus the textures become broken down and disintegrated. Coextensive and concomitant with these changes, normal function is deranged and vitality diminished. It is now conceded by physiologists, that although there is a *remora*, or stagnation of blood in an inflamed part, yet that the circulation is preternaturally active in the parts adjacent. The arteries beat with greater force; more blood is sent to the spot, which, however, meets with obstruction, and thus causes an unusual beating and throbbing; absorption seems to be suspended during the inflammatory process, but is speedily resumed as soon as abnormal action has ceased, by which the part is restored to its former condition.

MM. BECQUEREL and RODIER (*Gazette Medicale de Paris*, 1844) have recently, by an extensive series of experiments, confirmed the observations of ANDRAL, that the development of a phlegmasia increases the fibrinous constituent of the blood. They have, moreover, shown that the *cholesterine* as well as fibrin is increased, while the albumen is diminished. The increase of fibrin they found to correspond with that observed by ANDRAL, it being in direct relation to the extent and intensity of the phlegmasia, to its influence on the general state of the organism, and particularly to the febrile disturbance to which it generally gives rise. They found its increase, also, coincident with the development of the phlegmasia, and accompanying, but never preceding it, and much more observable in acute than chronic phlegmasia. Blood-letting they found to have little influence on the fibrin, which decreases with the disease rather than with the means employed to combat it. Its increase in the blood, they observe, is usually manifested by the formation of a buffy coat on the surface of the clot, which is, at the same time, more dense than in the normal state; or, if the buffy coat is not formed, by the presence of more or less numerous whitish striæ, especially existing near the superior surface of the clot, and announcing, as well as the buffy coat, the excess of fibrin in the circulating fluid. In accounting for the fact that, while the fibrin is increased in inflammation, the albumen is diminished, they suppose that these substances are the same, or at least that fibrin is derived from albumen, and that the increase of fibrin is produced by the transformation of an equal quantity of albumen; a change which may easily occur, considering that they both have the same chemical composition. They found the quantity of cholesterine in inflammation nearly double that of the normal state; and they suggest that it may be owing to a diminution of the biliary secretion from the rigorous diet enjoined, thus leading to an accumulation of this fluid in the blood. We have formerly remarked that the fibrin is also increased in chlorosis and in pregnancy.

The opinion generally prevails among physiologists that fibrin has a spontaneous tendency to coagulate; that this spontaneous coagulability is a characteristic property of fibrin, by which it is distinguished from albumen and casein; and that the coagulation of the blood, and of various other animal fluids, depends on the spontaneous coagulation of the fibrin which they contain. Dr. BUCHANAN, however, of Glasgow, has recently advanced the opinion, which is sustained by a variety of facts and experiments, that fibrin has not the least tendency to deposite itself spontaneously in the form of a coagulum; that, like albumen and casein, fibrin only coagulates under the influence of suitable reagents; and that the blood and most other liquids of the body, which appear to coagulate spontaneously, only do so in consequence of their containing at once fibrin and substances capable of reacting upon it, and so occasioning coagulation. Thus, Dr. B. shows that the *clot* in blood, cellular membrane, and other organic solids have the property, by a sort of *catalytic* action, of inducing the coagulation of fibrin in liquids containing it. Thus, if we mix a very small portion of liquid blood, just drawn from the vein, with six or eight parts of pure serum obtained from blood drawn the day before, we shall be able to separate a portion of fibrin in a perfectly soluble form, in a translucent mass, although the coagulation will be much retarded. This experiment shows very conclusively that the fibrin is actually dissolved in the blood, and is not a constituent of the red particles. Dr. B. has also shown that a serous fluid, as that of hydrocele, may hold fibrin dissolved, and that this principle will not separate by spontaneous coagulation, requiring a catalytic action, similar to that of the clot in blood and analogous to the action of *rennet*, or casein, to induce it. These results show that spontaneous coagulability is no longer a sure test for fibrin in organic liquids; and that the old division of blood into coagulable and uncoagulable lymph is founded in truth.—(See *Lond. Med. Gazette*, Aug. 8, 1845, p. 20.)]

164. *C. Of the Intermediate States of Vascular Action and Vital Power in Inflamed Parts.*—As shown in the article DISEASE (§ 87, *et seq.*), the states of organic nervous influence and vascular action do not always present specific grades or forms, which certain terms can precisely represent. The terms applied to morbid action are entirely relative; and while we use the appellations *sthenic* and *asthenic*, to convey an idea of the more extreme and opposite states of nervous power and of vascular action, we must not overlook that every intermediate form and grade may exist between them. To describe states, so diversified as these are, is obviously impossible. All that can be attempted is to notice certain circumstances generally appertaining to them. The organic nervous power, evinced by certain inflammations, may not materially vary in *kind* from the natural standard or condition, and yet vascular action may be excessive and very acute, or much more moderate, and, consequently, more protracted or slight, and more or less chronic. The forms of inflammation, particularly as respects the

acute, chronic, and intermediate or sub-acute states, result chiefly from the grades of organic nervous excitement and vascular action; while the more specific characters which they present depend principally upon the conditions of the organic nervous energy, as regards not only the *amount* of the excitement or depression, but especially the alterations or *deflections in kind* from the natural habitudes of this energy. While the *activity* of the inflammation depends chiefly upon the grade of vascular action in the inflamed part, in connexion with the degree of general vascular commotion, the *specific character* of inflammation arises principally from the truly diseased impression made upon the organic nervous tissue of the part, and from the change thereby effected in the influence of this tissue on the vascular system, such change being in the kind, rather than in the degree of organic nervous influence.

165. The varieties of Erysipelas, the local inflammations attending the different *exanthemata*, and, indeed, the numerous specific forms of inflammatory action induced by these and other infections or animal poisons, are illustrations of alterations in the *kind* or *mode*, rather than in the *degree* of local and general organic nervous energy and vascular action. In these, and in all the asthenic states of inflammation, there is a much more remarkable alteration in kind from the natural standard than in the sthenic forms. The *intermediate states* between the most fully expressed sthenic and asthenic conditions, depend chiefly upon specific or other deviations in kind—*upon the truly morbid changes* now contended for, especially such as immediately proceed from the nature of the exciting causes, or from contagion. The principal of these, owing to their specific form, are fully discussed under appropriate heads.

166. *D. Of the Existence of different States of Capillary Tone and Circulation in the same Inflamed Part and the Vicinity.*—Much of the discussion which has taken place as to the capillary circulation in inflamed parts has been owing to the variations in this state during the course of the disease, and to the different vital conditions of the capillaries and of the small arteries in different parts, or in the several tissues comprised in the seat of inflammation. When compound or parenchymatous structures are inflamed, such differences or variations are the most remarkable, particularly if the disease has commenced at a single point. At this point, especially, the tone of the capillaries becomes the soonest exhausted, and the current of the blood retarded; and these states increase the vital turgescence of the surrounding vessels, and accelerate the circulation through them. When the substance of an organ is inflamed, the fibrinous lymph exuded at the point first affected often retards, by its pressure, the circulation in the vessels at this point; and owing to this obstruction, the surrounding vessels are the more readily developed, and more prone to become morbidly turgescent. The lymph effused also affects the vitality of the part, either occasioning more or less irritation to the organic nervous tissue, or perpetuating or modifying the disorder of this tissue already existing, that caused its effusion. Muller thinks that the lymph coagulates in the extreme capillaries when the inflammation is seated in the substance of an organ; but I believe that it is exuded in the areolæ of the structure, thereby rendering the part more solid or dense; the change thus produced having been termed condensation, solidification, hepatization, or splenification, according to the appearances assumed, and to the organ affected. It is only in the sthenic forms of inflammation that the effused fluid gives rise to these changes, as shown above.

167. If the intensity of the morbid action in the spot first affected be so great as to exhaust its organic nervous power, or its vitality, and to retard its circulation, or to stagnate the blood in the capillaries, not only do the surrounding vessels become more turgescent and developed, but the blood which has thus stagnated, and the tissue itself, undergo very material changes, as described above (§ 156). Hence very opposite states of the circulation generally exist in different parts of the seat of inflammation, especially when the disease is advanced. In cases of injury, particularly of laceration, pressure, or other changes, the capillary circulation is often directly obstructed; and either independently of lesion of the organic nervous tissue and sensibility, or aided by such lesion, diseased vascular turgescence is thereby developed around the seat of injury—the capillaries thus obstructed, and the blood contained in them, soon undergoing changes productive of suppuration, or ulceration, or gangrene, while sthenic vascular action is either proceeding in the surrounding turgescent vessels, or passing into exhaustion or into the asthenic condition, progressively from the point of injury, or from the spot first affected, according as the constitutional powers may resist or may favour the extension of the mischief.

168. *E. Of the State of the Venous Circulation in Inflamed Parts.*—There is every reason to believe that the venous circulation is locally more than usually active in the sthenic and acute forms of inflammation; but that it is more or less languid in the asthenic varieties. When the former, also, goes on to suppuration, and especially to ulceration, the circulation in the veins, more immediately proceeding from the part, is generally somewhat retarded, the retardation increasing these changes. Hence the importance of favouring the return of blood from the part by position when these consequences of inflammation have taken place. Whenever the venous circulation is obstructed, effusion and œdema increase rapidly in the part affected, and in its vicinity; and the consequent retardation or stagnation of the blood in the capillaries induces or accelerates disorganization. This is observed very frequently in erysipelas, and constantly when the inflammatory action extends to the veins, which not infrequently occurs when the constitutional powers are depressed, or in the more asthenic forms of the disease. In such cases the local lesions are remarkably increased, not only by the stasis of blood in the capillaries, but also by the more copious morbid effusion caused by the obstructed return of blood.

169. *Of the Function of Absorption in the Seat of Inflammation.*—In the early stages of sthenic inflammation especially, absorption seems to be less than usually active; but, when the disease proceeds to ulceration, or even to suppuration,

and when it assumes asthenic forms, then the absorbent action is often increased, although there are numerous exceptions to this, absorption sometimes being manifestly impaired. When the absorbents become inflamed, owing to the morbid nature of the cause, or of the matter formed in the primary seat of disease, then more or less of obstruction results, and the function is arrested, great tumefaction of the parts beyond the obstruction taking place, and increasing the local mischief by pressure and by the contaminating influence of the morbid secretion. In obstructed venous circulation the swelling increases rapidly, chiefly from augmented effusion; in impeded absorption it advances with nearly equal rapidity from the fluid being undiminished by removal. In either case the effused fluid undergoes material changes during its retention, and becomes more and more hurtful to the tissues containing it, and more irritating to the vessels which may absorb it.

170. It was supposed by John Hunter and others, that *ulceration* depends upon increased activity of the absorbents of the part, when inflammation has reached a certain period of its progress. But I believe that it is chiefly owing to the superficial softening or loss of the vital cohesion at that part of the inflamed tissue where the extreme vessels have lost their functions, and to the solution of the molecules of the tissues in the fluid effused from the diseased surface (§ 48). Absorption is probably also concerned in the process, and in various degrees, according to the seat of the inflammation, and the states of organic nervous or constitutional power, and of vascular action.

171. *G. Of the States of the Blood in the Capillaries of Inflamed Parts.*—The blood circulating in inflamed parts presents very different appearances with the form and stage of the disease. In the sthenic forms, and particularly in the early stages, before any of the more unfavourable consequences have supervened, the blood is florid, and partakes much of the characters of arterial blood; but in the asthenic forms, and less remarkably in the advanced stages of the sthenic, it is more venous, or of a darker hue. It is sometimes quite purplish, or blackish, particularly when a tendency to sphacelation or gangrene occurs. Also, as it circulates in the capillaries, the globules seem, under the microscope, gradually to move more slowly, and to be attracted by the sides of the vessel, or to stagnate in the capillary canals. This change seems to commence in the smaller or capillary veins, and to extend, especially in the asthenic states of inflammation, in the direction of the minute arteries, the temperature sinking with the deepening of the hue, and with the loss of motion of the blood globules. In other respects the blood presents the appearances already described with reference to the different forms of inflammation. (See § 25, 66).

172. iii. Of Reparation of the Consequences of Inflammation.—Reparation of the effects of inflammation is accomplished only under the influence of life, although much assisted by art. It may be very briefly considered with reference, 1st, to the removal of those changes more immediately resulting from inflammation that are independent of loss of substance; and, 2d, to the restoration of disorganized or of lost parts, where either has taken place. Whether morbid depositions are to be removed or losses of substance are to be supplied, restoration of the manifestations of life in the various organs to their healthy states is the chief intention to be fulfilled. Frequently nothing more than the subsidence of the morbid action in the affected part is necessary to the reparation of the injury done; but often something more is requisite, and the aids of science are needed to assist in the work of restoration.

173. *a.* The *softening*, or impaired vital cohesion of the inflamed part, the *fluids effused* in the areolæ of the tissue, and the coagulated lymph thrown out upon a serous surface, or poured into the porous structure of an organ, so as to solidify it, will generally be removed, when the morbid action which caused these changes has altogether subsided. With the return of the functions of the part the vital cohesion will be restored, and the activity of absorption will gradually remove the fluids effused in the substance or upon the surface of an organ. If the lymph have become partially organized, or have formed false membranes on serous tissues, or have agglutinated the opposing surfaces of shut cavities, the difficulty of removal will be increased and the time of effecting it prolonged. But if the inflammatory action be entirely subdued the object will be ultimately attained, and with a rapidity and certainty in proportion to the restoration of the powers of life throughout the frame. Even when the coagulated albumen is organized into false membranes, or into cellular adhesions, their extent and their vascularity will gradually diminish, and they will either entirely and slowly disappear, or become merely lax bands, or thin films, offering little or no impediment to the functions of the parts which they connect. Yet, where such adhesions form, a disposition to returning inflammation will generally exist, or the morbid action which produced them will continue in a much slighter and chronic state. It is chiefly to these circumstances that most of the unfavourable results consequent upon adhesions are owing. The lymph effused in the areolæ of a parenchymatous viscus, as in hepatization or splenification of the lungs in pneumonia, is commonly soon removed with the subsidence of the disease, and much more rapidly and certainly than the lymph poured out upon a serous surface. The albuminous exudations sometimes formed on mucous membranes very rarely or never becomes organized, but are detached and thrown off as the diseased action subsides by an increased secretion of mucus from the follicles underneath. In the course, however, of their excretion from the canals which those membranes cover they often occasion remarkable disturbance, severe spasms, or even death by asphyxia, especially when they form on the respiratory surfaces, as in *croup, laryngitis, &c.*

174. *b.* When the organic nervous and vital powers continue but little impaired, serous and albuminous fluids effused during inflammation are generally removed upon the subsidence of diseased action, although the rapidity and completeness of removal will depend much upon the nature, consistence, and extent of the effusion, and the states of constitutional energy. If the fluid is truly purulent, and especially if

it form an encysted or circumscribed *abscess*, restoration is then generally difficult, and only to be accomplished, particularly when the collection is deep-seated, either by absorption or by the extension of the abscess to an external or internal surface, as is fully shown in the art. Abscess (§ 30). When the fluid of an abscess is absorbed, nothing but a firm cicatrix, generally linear, or irregular and circumscribed, is observed in its former seat. But when it finds its way to a surface and is evacuated, either the patient sinks under the local lesion and discharge and the constitutional disturbance, or the work of reparation proceeds under the influence of the vital energies. In this latter case the discharge from the surface of the abscess becomes albuminous, the parietes contract, and the cavity diminishes. Instead of pus an albumino-puriform fluid is secreted, which gradually becomes more and more albuminous and scanty. The fluid exuded upon the internal surface of the abscess at last passes into the state of coagulable lymph, under the restoring influence of the organic nervous energy; it becomes vascular, and healthy granulations thus form, and fill up the cavity which the contraction of its parietes is incapable of obliterating, and thus the injury and loss of substance are repaired.

175. In the reparation of *ulcerated* parts a similar process takes place. The softening and solution of the molecules of the tissues in the fluid discharged from the ulcerated part are first arrested by restoring organic nervous energy, by local or constitutional means, or by both. Thereby a more healthy secretion takes place, and suppuration is established, and is followed by granulation in the manner just described, the mischief being thus repaired. Ulceration is most prone to occur, and to proceed rapidly in parts exposed directly or indirectly to the air, or to the contact of irritating matters; and in those which are most distant from the centre of the circulation, and in which the capillary circulation is naturally weak or slow. Hence it is of importance to the reparation of an ulcerated part to protect it from those sources of irritation. When an ulcerated surface is extensive and the tone of its vessels much impaired, the discharge is generally so copious as to detach from it all applications calculated to protect it from irritation, and is so injurious or contaminating as to increase the mischief if allowed to remain any time in contact with it. The first object in such cases is to restore the organic nervous energy and tonicity of the capillaries of the part, and thereby to diminish the quantity and to improve the quality of the discharge. The fluid subsequently exuded on the diseased surface will often of itself serve as a protection; and applications which restore the tone of the extreme vessels and diminish or coagulate the discharge, while they farther protect the part, will then be of service, complete reparation taking place under the eschars, or scabs, sometimes thus formed. In this manner strong solutions of the nitrate of silver, or other stimulating and astringent substances, often act very beneficially on ulcerated surfaces, whether the discharge coagulate on them or not. But this subject will be more appropriately considered hereafter.

176. *c.* In cases of *divided* or *injured parts*, when the blood or the fibrinous lymph exuded from the capillaries coagulates so as to protect them entirely from the air, and without allowing coagula or any other substance to remain that may occasion irritation, the healing process often proceeds without any evidence of phlegmasia taking place. When divided parts are brought in contact, after the hæmorrhage from them has ceased, the lymph exuded from the opposing surfaces will first slightly agglutinate, and afterward perfectly connect them, small capillary vessels penetrating and organizing the connecting medium, which will diminish more and more as it becomes firmly organized. In this process, which has been called by surgeons "*union by the first intention*," inflammatory action can hardly be said to exist. If it actually take place, very different phenomena present themselves. This process has, however, been described as a consequence of phlegmasia—probably owing to the circumstance of inflammation actually taking place in some parts or other of the surfaces, the union of which is thus attempted, and which various causes prevent from uniting, and chiefly by exciting inflammation in them. It is very rare that divided surfaces entirely unite without this disease being excited in some portion or other; for incongruous parts or tissues are often brought together that are incapable of uniting directly. These must necessarily become inflamed, and give rise to the usual consequences of phlegmasia. Moreover, the fluids and blood effused from the divided structures, and the ligatures placed upon the larger vessels, are sources of irritation, seldom failing of producing inflammatory action, although the more congruous tissues may have perfectly united. In all such cases union has taken place in the uninflamed parts only.—(See the *Local Treatment of* Inflammation.)

177. VIII. Treatment.—The treatment of inflammation must necessarily be guided by a variety of circumstances and considerations. The chief of these refer, 1st, to the disease itself; 2d, to the individual affected; and, 3d, to the nature of the exciting causes.—*a.* The character, form, progress, and consequences of the inflammation existing at the time of treatment should be carefully weighed, as these severally require very different, or even opposite indications and means.—*b.* The age, strength, temperament, diathesis, habit of body, modes of living, and occupations of the patient, ought also to be taken into consideration, and the treatment modified accordingly.—*c.* The exciting causes, the states of constitutional predisposition, and the predominating influences to which the patient is subjected, should be ascertained as fully as possible, and the means of cure selected with strict reference to them. As the form and character of the inflammation depend chiefly upon the circumstances here alluded to, I shall discuss the treatment which observation has shown me to be most appropriate and successful in each of the principal forms under which I have described this important class of diseases.

178. i. Treatment of Sthenic Inflammations.—*A. Acute Phlegmasia.*—*a. At an early stage* of all sthenic inflammations, the *indications of cure* are, 1st, to lower general and local vascular action; 2d, to equalize the circu-

lation, and to derive from the seat of disease. Several of the means which are employed to fulfil the *first* also often accomplish the *second* indication.

179. (*a*) *In order to lower general and local action*, numerous agents are usually prescribed, according to the peculiarities of the case. These operate either upon the system in general, and indirectly upon the part affected, or immediately upon the latter, and consecutively upon the former, according to their natures and the manner of employing them.—*a*. Of those which act in the first of these modes, *blood-letting* is one of the most important. It has been, however, very much abused; and the cure of inflammations has too generally been attempted by it chiefly, or even alone. There are numerous circumstances which either very remarkably limit or entirely contra-indicate the employment of blood-letting, in those morbid conditions in general which have been all denominated inflammation, although differing greatly from each other; and even in this the least equivocal form of the disease, there are many considerations which should weigh with the practitioner in limiting the amount of the depletion on the one hand, or in inducing him to carry it far on the other. The extent to which it may be prescribed should be determined by the age, strength, temperament, diathesis, and habit of body of the patient; by the constitutional symptoms; by the vital importance and structure of the part affected; by the duration of the inflammation; by the states of the pulse and of the blood first drawn; by the effects produced by a former depletion; and by the condition of the tongue, skin, and urine.

180. If the patient be young and robust, and well nourished—if the disease be very acute, or seated in a vital organ or serous surface—and if the constitutional affection be of a manifestly sthenic kind, the quantity of blood taken at first should be very considerable, and it ought to be taken in such a manner as to make a decided impression upon the circulating system as soon as possible—or in a large and full stream, so that the rapidity of the abstraction may assist the quantity in the effects produced upon the disease. As I have recommended in the article Blood (§ 64), the depletion should be effected while the patient is in a semi-erect or semi-recumbent posture, in order that the desired approach to syncope may be more certainly produced, without, however, causing syncope, for the reasons fully explained in the article just referred to. The first abstraction of blood ought to be instantly followed by the means about to be noticed (§ 196); but the circumstances now stated as demanding a full or large depletion in the first instance, will require a repetition of it, generally to a less amount, but in strict reference to the local and constitutional symptoms, to the effects produced, to the time which has elapsed from the first blood-letting, and to the appearance of the blood then taken away.

181. The *pulse*, the *blood*, and the character of the *pain* in inflammations furnish many useful indications as to the *institution*, the *repetition*, and the *amount* of *depletion*; but they may mislead most remarkably, if the numerous exceptions they afford, and the circumstances in which these exceptions occur, be not taken into account. In inflammations of vital organs, and particularly of the stomach, of the intestines, or of the substance of the brain or liver, the very intensity of the disease may produce so severe an effect upon the constitution—so violent a shock to the vital powers—as to deprive the *pulse* of firmness or tone, and to cause, not only an oppressed, but also a weak, small, slow, or an irregular state of pulse. In such cases the practitioner must not be deterred from blood-letting by this circumstance; for, after a few ounces of blood are abstracted, the pulse will become more full, strong, and regular. In all inflammations, especially of vital parts, depletions should be performed with a most attentive regard to the phenomena while the blood is flowing; and in cases similar to those alluded to, the effects ought to be most assiduously watched. If the pulse rise in strength, and especially if it become hard, as well as developed or full, the blood-letting may even at first be carried so far as to make an impression upon the circulation, and to reduce the pulse again in strength and fulness. When the pulse is open and throbbing, or jerking, as generally observed after copious hæmorrhages, blood-letting will rarely be of benefit, although it has not been already resorted to, and it may be most injurious. Where a moderate blood-letting produces sinking or syncope, without affording relief, it will be injurious to pursue the practice farther, if, indeed, it has not already been prejudicial.

182. A hard, tense, or strong pulse not only requires a very copious depletion at first, but generally also a repetition of it. If a pulse which was too frequent and too full is reduced in these respects—or if a hard, constricted, or small pulse is softer and freer—or if a pulse hitherto slow and oppressed has become more natural—it may be concluded that the bleeding has been of service, and that it may be safely repeated to a less amount if the symptoms require it. If, on the contrary, the pulse has become weak, hurried, compressible, open, jerking, irregular, or intermittent, without producing relief, the bleeding has already proved injurious, and a repetition of it would be productive of danger. It may be taken as a general rule, that when the pulse is above 110 and compressible, whatever may be the organ inflamed, the system will not bear general blood-letting, even in the first instance. The local abstraction of blood, however, with caution, may prove of service.

183. The *appearances of the blood* first abstracted have generally influenced the physician more or less in prescribing a repetition of depletion; but they ought to be considered in strict connexion with the other symptoms. The appearances most deserving of notice are, the firmness or looseness of the crassamentum; the proportion it bears to the quantity of the serum; and the presence or absence of buffiness, and cupping of its surface. In the article Blood (§ 96, 97), and in a previous section (§ 25), I have fully discussed the appearances of the blood indicative of sthenic inflammations. These should receive attention in practice; but I may here remark, that although a cupped and buffed state of the crassamentum is evidence of an excited state of circulation, and very frequently attends inflammation, yet

alone, or without the presence of other symptoms indicating the propriety of blood-letting, it is no proof that this measure has been indicated, or that its repetition is requisite. When, however, the crassamentum is large, firm, or dense, and the buffy coat is considerable, thick, firm, and tenacious, the other signs of inflammation being present, depletion may be repeated, and occasionally oftener than once. If the clot be loose, has a thin or an irregular edge, and especially if it be small relatively to the quantity of the serum, a repetition of depletion will be injurious. In all cases the appearance of the blood depends much upon the manner in which it is taken, especially upon the size of the orifice, the posture of the patient while the blood flows, and the shape and size of the vessel in which it is received. A buffy, cupped, and firm coagulum will form in a deep or narrow vessel, particularly if the blood flow rapidly, while neither of these appearances will occur if it be received in a wide and shallow vessel.

184. The *pain* and other local symptoms ought also to guide the practitioner as to the extent to which depletion should be carried; but these should not be exclusively confided in, for the most violent pains, as shown above (§ 82), are generally independent of inflammation, and are not abated by vascular depletions. Nor are all alterations of sensibility depending upon inflammations to be relieved by blood-letting; for the most severe pains accompanying asthenic inflammations will very often not be even mitigated by it, although altered sensibly in the sthenic forms, now more especially under consideration, will generally be entirely removed by it, if it be actively and judiciously practised. As long as pain and tenderness on pressure continue, the pulse being firm, resistant, or constricted, and not very frequent, general blood-letting may be repeated, although some exceptions to this rule may present themselves; but in most of these local depletions may be employed. If the pain return after having disappeared, or if it become exasperated, although blood-letting has been instituted, a repetition of the measure is necessary, unless the other symptoms obviously forbid it; for, in this latter case especially, the first depletion has only relieved the load which overwhelmed the sensibility of the organ, and a second, or even a third, is requisite to restore the circulation of the part to its healthy state.

185. The *absence of pain* ought to be no argument against resorting to vascular depletion, if other symptoms indicate the propriety of it; for intense inflammation may exist in the parenchyma of an organ, particularly the brain, the liver, the lungs, or the kidneys, and even in mucous or serous membranes, without pain being complained of, or without sensibility being farther disturbed than is indicated by a feeling of heat, or of oppression, or of weight.

186. The *functions* of the inflamed organ ought also to indicate the propriety of repeating depletion. When they are restored, then the chief object is attained, and no farther loss of blood should be inflicted on the patient; but if they continue to be suspended or disordered, or if they are only partially restored or improved, local depletions, at least, are required, especially if due time have been allowed for the first bleeding to produce its effects.

187. The *tongue* furnishes important indications as to the propriety of general or local blood-letting. When the papillæ are distinct and erect, the tongue being white or loaded, and inclined to be dry, or its edges or point more or less red, vascular depletions are generally necessary. When the fur on the tongue is erect and white, and the sides and point red, blood may be taken away, if no symptoms contra-indicate the practice. On the other hand, when the papillæ or the fur is flat, and the tongue very moist or watery on its superior surface; when it is broad, flabby, fissured, or lobulated; when its edges are indented by or retain the impression of the teeth; when it is pale, especially at its point or edges; when it is tremulous on being held out; and when it is covered by a thick, dark mucus or fur, bleeding is generally inadmissible.

188. When the *cutaneous surface* is hot and dry throughout, depletion will be of service; but if it be cold, clammy, and shrunk, or if it be covered by a hot, clammy perspiration, blood-letting will be inappropriate, as the chief objects intended to be accomplished by bleeding are to lower general action and to produce relaxation, and these are already attained. If the *urine* is high-coloured, scanty, and does not deposite a sediment, blood-letting may be practised, if other symptoms do not contra-indicate it; but if the urine be pale, limpid, and copious, it will generally be injurious.

189. Besides these guides to the institution and repetition of vascular depletion, there are various others, appertaining to the organ affected, &c., which should guide the physician; but these do not come under consideration in this place. The age, constitution, and diathesis of the patient, and the other states of predisposition, as well as the exciting causes, however, require some notice. The very young (infants) and the aged should be depleted with caution. Persons of a nervous or lymphatic temperament cannot bear so large losses of blood as those who are sanguine, irritable, or sanguineo-melancholic. In the gouty and scrofulous, in the previously diseased, in the ill-nourished, in the very obese, and in persons of a relaxed fibre, or leucophlegmatic or cachectic habit of body, such losses are generally injurious.

190. The nature of the *exciting causes*, and the *influences, mental and physical*, operating on the patient during treatment, should greatly influence the amount of vascular depletion. Inflammations consequent upon active excitement, or attending vital reaction, are most benefited by this measure, while those caused by septic, poisonous, infectious, or contaminating agents are generally aggravated by it. All the depressing affections of mind, an air loaded with malaria or paludal exhalations, the foul air of hospitals, and the confined atmosphere of large towns, particularly in crowded dwellings, in low cellars, in close lanes or alleys, and in manufactories, frequently not only prevent the good effects of bleeding from ensuing, but also render its institution or repetition injurious.

191. The *prevailing epidemic constitution*, or the general character presented by epidemic and other diseases, should always be kept in recollection, especially as respects the employment of blood-letting. The inflammations which

occur in the puerperal states, erysipelas, and the inflammatory complications observed in the courses of exanthematous and continued fevers, vary remarkably in their particular characters, according to the prevailing constitution. At the period of change from one general constitution to another, it is very difficult at once to determine upon the admissibility of blood-letting, particularly as regards the diseases just named and others allied to them; but close observation of the morbid phenomena, and attention to the circumstances and considerations now enumerated, will lead to a right determination as to this practice. Generally speaking, also, it will be found that all inflammatory diseases attended by a free state of the secretions; by copious fluid defluxions, particularly from the seat of disease; by a moist or relaxed skin, or irregularity and weakness of pulse; by physical and mental depression, and especially by great despondency, unfavourable anticipations of the result, or indifference to objects of former or natural endearment, will either not be relieved or will be aggravated by blood-letting.

192. β. *Local depletions* are often sufficient, in many forms, states, or stages of inflammation, to accomplish the ends in view. The circumstances requiring *local* in preference to *general blood-letting* are chiefly the following: 1st. The slighter states of inflammatory action; 2d. Forms of the disease approaching to or partaking of the asthenic condition; 3d. A stage of inflammation too far advanced to admit of or to be benefited by general depletion; 4th. When venæsection has been carried so far as not to admit of its repetition, the disease being either unsubdued or only mitigated, and requiring to be aided by this means; 5th. When it is desirable to derive from the seat of disease, as well as to deplete moderately; 6th. When it is wished to remove local congestion of the vessels, and to restore the sensibilities and functions of the affected part; and, 7th. When inflammations occur in debilitated, nervous, or delicate constitutions, and as complications of febrile or other diseases.

193. The *modes* in which local depletion should be performed also require attention. When a considerable quantity of blood is to be abstracted, and it is desirable to effect a rapid derivation from the seat of disease, then *cupping* is to be preferred; but when the quantity is to be small, and when the application of warm fomentations and poultices to the part subsequently is likely to be serviceable, then *leeches* are more appropriate. Where the morbid sensibility and situation of the parts prevent the having recourse to cupping, a large local depletion being requisite, then a great number of leeches should be applied. In such cases the fomentations and poultices used to promote the bleeding will act beneficially in soothing the altered sensibility, upon which much of the diseased action depends. When the part inflamed admits of the direct application of leeches, it is often doubtful whether they should be placed upon it or not; for in some constitutions the punctures of leeches are followed by much local and general irritation, or even by erysipelatous inflammation; and if a small number be employed, they only increase the local irritation and determination, without unloading the vessels of the diseased part. In these cases, depletion by more or less numerous or deep scarifications is sometimes more beneficial than by leeches, especially if the vessels are much engorged. It should also be recollected that bleeding by leeches occasions much greater depression, relatively to the quantity of blood abstracted, than by any other mode, especially in nervous and susceptible persons; and that in some constitutions and situations the bleeding from their bites is not readily arrested. When the vital tone and cohesion of the tissues are much weakened, as in febrile and malignant diseases, a fatal loss of blood may take place from them, if the bites be not watched for a considerable time after they are removed. In some cases, *cupping over the bites* of leeches is very advantageous in abstracting both a greater and more determinate quantity of blood, in preventing a prolonged and weakening discharge from them, and in determining the circulation to the part to which they were applied.

194. In visceral or internal inflammation it has often been recommended to apply leeches over the seat of disease; but, unless some advantage be expected from the subsequent fomentation, no additional benefit will result from the selection of this situation; and, if an intimate vascular connexion exist between the part inflamed and that to which leeches are applied, the blood may be injuriously determined thereby to the former place. When the phlegmasia is entirely visceral, the application of leeches to that part of the external surface which is over the seat of disease probably effects as complete a derivation from it as when applied to any other situation; while the subsequent fomentation tends to equalize the general circulation, and to determine to the surface of the body.

195. In conclusion, the propriety or impropriety of repeating blood-letting in inflammation, as well as of adopting it in the first instance, cannot be inferred from one symptom or consideration alone. The constitution, habit of body, and previous state of the patient, the condition of the various functions, the increase or decrease of the pain, and other morbid phenomena in the affected part, and the other circumstances stated above, should chiefly influence our decision upon these important points of medical practice.

196. γ. *Calomel* and *opium*, as so ably recommended by Dr. Hamilton, should be prescribed in a full dose immediately after the first blood-letting, whenever the inflammation presents an active or sthenic form. In acute phlegmasia of a vital or important organ, from ten to twenty grains of calomel, and from two to three of opium, and one grain of ipecacuanha, may be given at once. This combination will generally succeed in keeping down the general morbid action to that grade to which it had been brought by the depletion, and in preventing reaction from following thereupon. It will also relax the cutaneous surface, determine to the skin, and thereby equalize the circulation. In some cases, smaller doses, especially of the calomel, may be given, and repeated every fourth, fifth, sixth, or eighth hour, according to the urgency of the case, until a decided effect is produced upon the disease.

In all sthenic inflammations the specific effect of mercury upon the tongue and gums is not readily produced; but as soon as it begins to appear, the mercurial medicine should be relinquished, or the dose of it reduced. It is chiefly in cachectic persons, and in the asthenic forms of inflammation, particularly when vascular action is languid or low, or when there is but little excitement, that mercurials, especially in large quantities, are injurious. When sthenic phlegmasia is seated in serous membranes, or extends to them, the decided use of mercury, in the combination just prescribed, or in others hereafter to be noticed, is most requisite, in order not only to aid in the resolution of the morbid action, but also to prevent effusion, or the exudation of coagulable lymph, and the several ill consequences shown to depend upon effusion in its various states.

197. When inflammation implicates serous, fibrous, or even parenchymatous parts, preparations of *antimony*, especially James's powder or tartar emetic, may be combined with the calomel and opium, particularly for phlegmasia of the serous membranes of the chest and of the brain, and for pneumonia, &c.; but when mucous surfaces are inflamed, especially the intestinal mucous surface, *ipecacuanha* is preferable, and it may be given in large doses, as two, three, or four, or six grains, in the form of pill, with a full dose of opium. In many cases, also, *camphor* will be beneficially conjoined with calomel and opium; but when it is to follow a large depletion, or when sthenic inflammatory action is not fully subdued, it should be prescribed in small doses, so as to act as a refrigerating diaphoretic. It is chiefly in asthenic inflammations that full or large doses of camphor are required.

198. The *repetition* of calomel and opium, with or without either of the other medicines just mentioned, as to frequency, or the intervals between the doses, as well as the quantities of both, should entirely depend upon the intensity, the seat, and the other circumstances of the disease. The largest doses already mentioned should not be frequently repeated, unless in the most urgent cases. In some instances it may even be sufficient to give them only after each depletion, or to prescribe also, in the intervals, smaller quantities, as may be required. In the less severe states of inflammation it will be preferable to prescribe much smaller doses, as from two to five or six grains of calomel, and a quarter or half a grain of opium every four, six, eight, or twelve hours, according to the peculiarities of the case, in combination with either of the other medicines already noticed. After depletion has been decidedly employed, these doses will generally be sufficient, even in the more severe cases, and will often give complete relief, without affecting the mouth, their good effects being manifested chiefly on the general and local states of action, on the skin, and on other excreting organs.

199. *δ. Purgatives.*—Unless it be desired to produce a very speedy effect upon the system by calomel, or other mercurials given in the above combination, an occasional or even frequent recourse to purgative enemata will generally be necessary, although purgatives taken by the mouth may not then be requisite. Purgatives, however, are among the most important remedies used in the treatment of inflammations, their good effects depending upon several circumstances: 1. They evacuate morbid secretions and fæcal accumulations, which injure the organic functions, and depress or otherwise derange the powers of life, and which thereby favour the extension of the local affection, and increase the constitutional disturbance. 2. They diminish vascular fulness, by increasing the intestinal exhalations and the secretions of collatitious organs, and thereby lower febrile action. 3. They determine the blood to the digestive mucous surface, and derive it from remote parts. Owing to this last circumstance, they should be given with due caution when the digestive tube, or even when the viscera associated with it are inflamed. They are more serviceable in some inflammations than in others; thus they are more efficacious in congestions and inflammations of the head than in similar affections of the abdominal and thoracic viscera. The selection of, and modes of administering purgatives, also, are matters of great importance, but are so intimately dependant upon the nature of individual cases that no general rules can be stated as to these topics. The refrigerant purgatives are usually the most appropriate, as the sulphate of magnesia, and other neutral salts, either alone or with the infusion of senna; the bitartrate of potash with jalap; the spirits of turpentine with castor oil; calomel with the compound extract of colocynth, or with jalap, &c. One of the best modes of administering these medicines is to give them at first, or a few hours after a full dose of calomel or blue pill, in briskly cathartic doses, so as to clear out the bowels, and afterward to keep up a more gentle action by milder and cooling doses, or by suitable enemata, or by both. The operation, as well as the antiphlogistic effects of these, and of other purgatives that may be employed, will be promoted by adding to them the potassio-tartrate of antimony, or ipecacuanha.

200. *ε. Mercurials.*—Although calomel is one of the best purgatives that can be given in this class of diseases, yet it, as well as other preparations of mercury, is often required for its alterative effects chiefly, not only after bloodletting has been practised, and as above advised (§ 196–8), but also where depletion should not be adopted. In some cases it is necessary to use every means, and even several simultaneously, in order to arrest the usual course of the disease, particularly in inflammations of serous membranes, and of the larynx, trachea, iris, &c.; and one of these means is the rapid production of the specific effects of mercury. These effects being produced, not only is the resolution of the local morbid action thereby favoured, but also effusion is diminished, and the disposition to form coagulable lymph is entirely prevented. Hence mercurials, employed with the view of affecting the system, are most useful for inflammations of parts which give rise to albuminous exudations, and are either of little service, or even prejudicial, when prescribed for inflammations of cellular or parenchymatous structures, especially if these assume a diffusive, or spreading, or irritative

form. In such cases, other means, hereafter to be noticed, will be found more beneficial; but in acute sthenic inflammations, neither mercury nor any other means should interfere with blood-letting. It may assist in subduing and in removing several of the effects of these diseases, but it should never wholly supersede vascular depletion in some form or other. In chronic inflammations, however, where alterations of structure have commenced, and where they are but little influenced by depletion, mercury is one of the most efficient means that can be prescribed for the prevention of farther effusion, or other change, and for promoting the absorption of whatever deposition may have already taken place.

201. ζ. *Spirit of turpentine* is hardly known as an antiphlogistic remedy; and yet, from an experience during nearly thirty years of its effects, both in sthenic and asthenic inflammations, I believe that none is more deserving of confidence if appropriately and prudently prescribed. As I have long ago shown (*Lond. Med.* and *Phys. Journ.* for July and August, 1820), the operation of this medicine depends upon the dose, the frequency of the repetition, and the combinations of it with other remedies. Hence it may be made available in every form of inflammation. In the sthenic form it is remarkably serviceable after depletions have been duly practised, and it may be used both internally and externally—in draughts, or in enemata—in liniments, embrocations, or fomentations. In all inflammations tending to copious effusion, or to fibrinous exudation, after blood-letting has been resorted to, and more especially when it becomes doubtful whether general depletion should be prescribed, or repeated, or not, this substance, in hands experienced in its operation, is a most valuable remedy. In these cases it should be given in quantity sufficient to act upon the bowels and kidneys—either one drachm twice or thrice daily, or from three to six drachms once a day, alone, or with castor oil. It may also be administered once or twice a day in enemata in larger quantities. Where it is desired to produce as rapid an impression as possible upon the malady, not only should the one mode of exhibition be made subsidiary to the other, but both should be aided by the external use of this substance, in the form of a warm embrocation, fomentation, or epithem. In such cases I have generally directed several folds of flannel, large in proportion to the extent and severity of the disease, to be wrung as dry as possible out of very hot water, to be instantly freely sprinkled with spirit of turpentine, and applied immediately over the affected organ; to be closely covered, when thus applied, by wash leather, or a dry cloth, to prevent evaporation; to be kept thus applied as long as possible, or as the patient may endure it, and to be renewed as circumstances may require. In less severe cases, or at the commencement of inflammation, I have found a single application of this fomentation instantly arrest the disease, without depletion or any other means beyond a purgative medicine having been employed. In chronic inflammations, the *liniments* containing this substance, prescribed in the Appendix (F. 296–311), may be used either as such or as embrocations, or they may be applied over the affected organ, on the surface of warm flannel, in the way just described.

202. The spirit of turpentine, thus employed internally or externally, or both, need not prevent a recourse to calomel or other mercurials, but may be used, particularly in the more urgent cases, in conjunction with them, the former aiding the operation of the latter. Although one of the most efficacious means of arresting inflammation and its consequences, there is no remedy that requires more discrimination and experience of its action and effects than this. Much of the disappointment sometimes felt as to its operation has been entirely owing to the inappropriate use of it, and to injudicious modes of prescribing it. The practitioner who is well acquainted with its effects, in the various doses and modes of using it, will find it most effective in lowering general action when inordinately excited; in controlling local disease; in arresting the effusion of morbid fluids consequent thereon, and in determining the momentum of the circulation to the intestinal canal, to the urinary organs, or to the cutaneous surface, according as either effect may be desired, and thereby in deriving from the seat of disease.

203. η. *Refrigerants and Diaphoretics.*—Of these, the former are generally used in aid of more active measures, with the view of reducing the increased temperature, which aggravates or perpetuates the local morbid action; and the latter are prescribed with the intention of restoring or increasing the cutaneous functions, of thereby equalizing the circulation, and of removing a portion of the serous and excrementitious elements in the blood. In many cases, substances acting both as refrigerants and as diaphoretics are most appropriate, or those which exert the former action more readily produce the latter effect. Indeed, whenever vascular action is sthenically excited, the skin being hot and dry, it is necessary to lower the general action, and to give such substances as act in this manner, as the most certain means of procuring perspiration. In the majority of cases, after vascular depletion and other evacuations have been duly employed, the cooling diaphoretics are thus indicated; and, although more active means may be still requisite, particularly those already described, yet these will generally be found useful when taken in the intervals, or as occasions may offer. The diaphoretics which will be found most beneficial are, the solution of the acetate of ammonia, camphor, spirit of nitric æther, and a solution, or the wine of the potassio-tartrate of antimony, which may be variously combined, according to the peculiarities of the case.

204. *Warm, vapour,* and *medicated baths* are among the most energetic diaphoretics; but much judgment is required in prescribing them; for their effects will entirely depend upon the form, state, seat, and stage of the inflammation against which they may be employed. In acute sthenic inflammations, they should not be resorted to until vascular depletion has been duly employed and alvine evacuations freely procured. When, however, the stomach or bowels are inflamed, they may precede the use of means for the evacuation of the latter. In chronic inflammations of the internal viscera, or of the joints, fibrous tissues, &c., vapour

baths, various fumigating baths, and particularly those with sulphur or camphor, warm baths, especially those containing the decoctions of emollient herbs, or weak alkaline solutions; aqueous vapour with the fumes of camphor, or this latter conveyed around the patient, may severally be brought most advantageously in aid of other appropriate means.

205. *θ. Diuretics* are sometimes required in the treatment of inflammations, not merely on account of any derivation from the seat of disease thereby procured, but with the view of reducing whatever serous plethora may exist; and of removing from the circulation, by increasing the action of the kidneys, those ultimate products of assimilation which are liable to accumulate in the blood to an injurious amount during the febrile state, and thereby to heighten the local affection. With this intention, several of the more refrigerant diuretics may be advantageously employed, especially the spirits of nitric æther, the bitartrate of potash, and the neutral salts in small doses. They may be taken either in the patient's usual drink, or conjoined with the other medicines required by the particular circumstances of the case.

206. *ι. Narcotics* are occasionally beneficial, especially when inflammation is attended by great pain and irritability, and in the sthenic forms after vascular depletions and alvine evacuations have been duly practised. *Opium* and the *salts of morphia* are the narcotics most frequently prescribed, although *hyoscyamus*, *belladonna*, &c., may likewise be employed in some circumstances. Opium was much recommended for inflammation by medical writers during the seventeenth and eighteenth centuries, and frequently in combination with other medicines; but its use, or, rather, its abuse, was also greatly condemned. There are few medicines which require greater discrimination than this, and particularly when given in this class of diseases; for the propriety of having recourse to it will entirely depend upon the seat, stage, and form of the inflammation, upon the constitutional symptoms, upon the means previously employed, and upon the dose and combination in which it is prescribed. Dr. Armstrong advised large doses of opium after blood-letting, in a paper published in 1824 in the "*Transactions of the Associated Apothecaries*," under the belief that the advantages derived from the combination of calomel and opium, recommended by Dr. Hamilton, were entirely to be ascribed to the latter substance alone. In this, however, he was altogether mistaken; for this single remedy is not nearly so beneficial as in combination with calomel and the other medicines mentioned above (§ 196–8). Nor, indeed, did the practice present any originality; for it had been employed by numerous writers and practitioners long before he advocated it, even before the periods which I have already assigned.* Besides other instances in which I had prescribed it with great benefit previously to this time, I attended a case of phrenitis in 1820, with Mr. Carroll, of Walworth, in which three grains of opium were given at one dose, after blood-letting had been carried sufficiently far. In slighter cases, after vascular depletion and the operation of a cathartic, a large dose of laudanum, or of solid opium, has manifestly aided greatly in tranquillizing the nervous system, in reducing vascular action, and in procuring refreshing sleep, the patient awaking with a soft or moist skin, and with freedom from pain. Dr. Stokes has recently adduced evidence in favour of this practice, and shown that it is peculiarly beneficial in cases of recent inflammation of serous and mucous membranes, where blood-letting and other antiphlogistic remedies are inadmissible, and where the system is greatly depressed. In most instances, however, opium, or the salts of morphia will be more advantageously combined with calomel, as above advised (§ 196–198), or with ipecacuanha, or with camphor, or with James's powder, or the other preparations of antimony. Where pain is so excessive as to constitute the most prominent symptom, it is a most important remedy. When great exhaustion follows blood-letting, owing to its having been carried too far, or improperly resorted to, opium and camphor conjoined are most valuable medicines; and in the asthenic forms of inflammation, especially, should never be overlooked, particularly in conjunction with other means. The salts of morphia in similar combinations will be found equally beneficial.

207. The other narcotics, as *hyoscyamus*, *conium*, *stramonium*, *belladonna*, &c., are less useful in inflammations, and not so generally appropriate as opium; and yet instances often occur, in which a large dose of some one of these, according to the features of the case, may be preferred; and, after blood-letting and alvine evacuations have been duly practised, and in the combinations already mentioned (§ 196–8), will be found frequently of service. The chief recommendations in favour of these are, the circumstances of their not interrupting or suppressing the functions of secretion and excretion, and of their relaxing spasm of circular fibres and canals, as well as allaying irritation. It should, however, be admitted that, when opium is prescribed in large doses, it does not interrupt secretion or constipate the bowels so remarkably as when given in smaller quantities; and that these effects are then frequently even not observed.

208. *κ. Sedatives.*—Of these, *colchicum* is the most active; and, in certain kinds of inflammation especially, as the rheumatic and gouty, the most serviceable, when prudently prescribed. In the sthenic forms, also, of phlegmasia, it may often be advantageously brought in aid of other means. When it is desired to promote the secreting functions of the kidneys, and thereby to eliminate from the blood urea and its combinations, or other materials which would increase the local and general affection, if allow-

* [The treatment of inflammatory affections by large doses of opium, as recommended by Armstrong, was practised somewhat extensively in this country long anterior to its introduction into England. The late Dr. Post, of New-York, was partial to the use of this remedy in many of the phlegmasiæ, especially when attended with severe pain, and gave it in large doses, combined with mercurials, as far back as the year 1800. During the epidemic pneumonia, which prevailed in almost every section of the United States, in 1812–13–14, opium was given, by many practitioners, in large quantities, combined with calomel or tart. ant., and often with good effects. It has also been used in a similar way in the treatment of acute rheumatism, gastritis, and inflammatory affections of the intestinal canal, especially dysentery, &c., from almost the first settlement of this country, so that the claim of originality, which has been set up by some late practitioners in England, can by no means be sustained.]

ed to accumulate in the blood, then colchicum may be made a valuable remedy. Also, when inflammations are attended by a torpid or obstructed state of the liver, this medicine, conjoined with deobstruent purgatives, will be of essential service. In cases attended by very acute pain, or by the effusion of fluids from the inflamed part, it will also be of service, particularly when judiciously combined with other means; but its action should be carefully watched, as in some constitutions it produces most depressing and even injurious effects. It is best conjoined with camphor, the alkaline carbonates, magnesia, the neutral salts, and other purgatives; and is most serviceable after depletion and alvine evacuations.

209. *Digitalis* has been more generally employed than colchicum in inflammatory complaints, although it is a less efficient and even a more uncertain remedy than it. As long as vascular action is acute or sthenic, digitalis, even in large doses, exerts but little influence upon the circulation; while its cumulative effects will sometimes appear as soon as the symptomatic fever abates. It is most serviceable as an adjunct to other means, whose operation is more decided and certain, especially where effusion has commenced, or is about to commence, from the diseased part; when inflammation attacks debilitated, cachectic, or delicate persons, who cannot bear general or free blood-letting; and when it assumes slight, chronic, or subacute forms.

210. *The preparations of antimony*, particularly the *potassio-tartrate*, given in large and frequent doses, produce a sedative, or, according to Rasori and his followers, a *contra-stimulant* effect After causing vomiting, they act upon the bowels and skin, and reduce the pulse in strength, fulness, and sometimes in frequency. For inflammations of the thoracic viscera, and of the brain and its membranes, a decided and judicious use of these medicines, after due vascular depletion, is generally of great service; but they should never supersede this latter, although they may prevent the having recourse to very large or repeated blood-lettings. In other circumstances, as well as in those just instanced, these preparations are very beneficial, particularly when conjoined with opiates or other narcotics; they lower general and local vascular action, relax the cutaneous surface, favour perspiration, and equalize the circulation.

211. The potassio-tartrate of antimony is seldom prescribed as an emetic in sthenic inflammations, unless in those affecting the respiratory organs and passages. In order to procure its depressing effects, a quarter or a third of a grain is usually given every two or three hours. The first two or three doses may cause vomiting, but nausea and a lax state of the skin and bowels will subsequently be the chief effects. Chronic inflammations are often subdued by this medicine, and the most successful results frequently follow it in delicate constitutions, when blood-letting does not promise any decided advantage. It should not, however, be carelessly employed, as I have seen it productive of the most injurious effects when pushed far in debilitated persons, and in young children. In smaller doses, as from the one fifth to the one tenth of a grain at the same intervals, it produces a salutary diaphoresis To effect this, however, it is seldom given alone, but is usually conjoined with camphor mixture, solution of the acetate of ammonia, the spirits of nitric æther, and sometimes with a small quantity of sulphate of magnesia or of the nitrate of potash.

212. The employment of large doses of tartar emetic in inflammations originated in Italy; and although it was at first discouraged by British practitioners, yet the experience of the ablest physicians in this country and on the Continent has now fully decided in favour of the practice. Since 1819, I have generally resorted to it in the manner just mentioned, especially in the treatment of inflammations of the respiratory organs, and generally with great benefit. There are few cases which, if promptly treated by bleeding, and subsequently by this medicine, will not be very materially relieved; and in those which have been neglected, or in which the proper time of bleeding has gone by, this substance, with mercury, or with the solution of the acetate of ammonia, or with opium, if it irritate the digestive canal, or with other appropriate means, will frequently prove of great service.

213. The empirical powder, introduced by Dr. James, is the next to tartar emetic, as an efficacious preparation of antimony in the treatment of inflammations. The *pulvis antimonii compositus* in the *Pharmacopœia*, which was intended as a substitute for it, cannot be depended upon. The different effects of these medicines have been attributed by Dr. Thomson to the fact of the antimony in the former being a protoxid, which is soluble; in the latter a peroxid, which is insoluble. Mr. Phillips seems to confirm this in his translation of the *Pharmacopœia*. In numerous cases of inflammation, and in many circumstances, James's *powder* should be preferred to any other antimonial. In *children*, particularly those which are very young, and for inflammations of the pulmonary organs, as well as of the brain and its membranes, in this class of patients, it is generally the best preparation of antimony, and the best sedative, that can be prescribed.

214. *Cold* is one of the most powerful sedatives, and one which is not always judiciously employed. There are few agents which are more efficient in constricting the vessels of the part than it; also, by altogether removing the principal stimulus to, as well as the chief consequence of vascular excitement, namely, increased temperature, it prevents the consequent exhaustion of the tone and vital cohesion of the capillaries and inflamed tissues. Yet, in medical practice, its appropriate use is comparatively limited, for it cannot be brought to act upon the majority of internal inflammations in such a manner as to ensure its good effects, or without interfering with other means upon which still greater dependance may be placed. It is also applicable only to the sthenic and acute forms of inflammation, for it is generally injurious in the asthenic and specific varieties, particularly the diffusive, erysipelatous, gouty, and rheumatic. In all cases of visceral inflammation where the application of cold tends to constrict the external surface, and to determine the circulation to internal parts, cold can rarely be advantageously prescribed; for

even when employed internally, or in enemata, it can seldom be prevented from superinducing reaction, or be so applied as to keep down vascular action for a continued or prolonged period. It is, however, different with inflammations of the brain or of its membranes, for the comparatively superficial and isolated situation of the diseased parts, their distance from the centre of the circulation, the minute division of the vessels in these organs, and the complete manner in which cold applications may be made to surround the whole seat of disease—in the form of the cold affusion, the ice-cap, evaporating lotions, &c.—combine to render cold more beneficial in these inflammations than in any others affecting internal organs.

215. It has likewise been recommended to employ cold in the treatment of other visceral inflammations, as in pneumonia, enteritis, peritonitis, &c. Breathing very cold air has been tried in the first of these by practitioners of the United States of America, and cold applied to the abdomen in the others by Dr. Sutton and by several German physicians, but with very doubtful advantages. Indeed, the results of such practice may be tolerably accurately inferred *à priori*.*

216. Among other sedatives, mention may be made of the *tepid bath*, and the *tepid affusion*, or *douche*; these, by abstracting heat, exert a depressing effect, and slightly constrict the surface. When the heat of skin is very considerable, the pulse being rapid and somewhat hard or resistant, the tepid bath is to be preferred to the warm bath, as it not only cools the surface, but also generally favours diaphoresis with more certainty than this latter. Indeed, in acute sthenic inflammations, the warm bath should not be used of a higher temperature than 96°, unless in cases presenting peculiar features. The tepid bath, or affusion, is frequently more appropriate in the early and acute stages of inflammation than the cold on the one hand, or warm, vapour, or medicated baths on the other, as it gradually reduces the temperature without favouring the occurrence of reaction. Warm, vapour, and medicated baths are most serviceable at advanced periods of inflammation, after evacuations have been freely procured, or when the disease becomes chronic or complicated.

217. *The abstraction of all causes of irritation*, as well as of the exciting causes of the disease, is obviously requisite in the treatment of inflammation. The excitement of the senses, especially of the organs of sight and hearing, and of the mental faculties, should be carefully guarded against. Muscular action, and stimulation of the stomach by heating food and beverages, ought also to be prevented, the antiphlogistic regimen being strictly enforced in all its parts.

218. λ. *Derivatives and counter-irritants.*—These should never be employed until the general vascular excitement is subdued by bloodletting and other evacuations, and until a powerful impression has been made upon the local affection. These ends being attained, the *mode* of derivation or counter-irritation should next be considered. This should depend upon the seat, form, and duration of the inflammation, and the consequences to which it may already have given rise. In acute cases, and at early stages of the disease, the *hot turpentine epithem*, or application, already described (§ 201), is the most efficacious, the safest, and the most immediate in its effects. It should always be applied over the inflamed organ, or as near it as possible. It is applicable to all forms of inflammation, in whatever organ they may be seated. It tends, more than any other derivative, to determine the circulation to the cutaneous surface, and to prevent the more dangerous consequences of the disease.

219. *Sinapisms* are extremely serviceable, and produce their effects rapidly, but they are less efficacious than the turpentine epithem. The application of the strong *solution of ammonia*, with tincture of camphor and spirit of rosemary, as advised by Dr. Granville, is also of use, and especially in weak, irritable, or nervous persons, and when inflammatory irritation is attended by much pain. It produces a very rapid effect, and either a superficial and slight, or a more severe and caustic action, according to the duration of the application. The liniment employed as a counter-irritant by the notorious empiric, St. John Long, was recently analyzed by Dr. Macreight, who found it to consist of oil of turpentine and acetic acid, held in suspension by yolk of egg. Having prepared a liniment consisting of *one ounce and a half of oil of turpentine, of one ounce of strong acetic acid, three ounces of water, and the yolk of one egg*, the last three being rubbed together, and the first being afterward added, Dr. Macreight found it, in its sensible properties and effects, to be identical with the empirical medicine. That a liniment consisting of these ingredients should prove of essential service in many cases, cannot be doubted. For upward of twenty years, and for several years before this fashionable empiric appeared, I had frequent recourse to a liniment, consisting of equal parts of the compound camphor liniment and the compound turpentine liniment, with a little cajeput oil as a counter-irritant, varying it, however, according to the peculiarities of the case, and as prescribed in various parts of this work, and in the Appendix (see F. 296–311). When this liniment, or any of the others just referred to, is applied on the surface of warm flannel, or of

* [The *Aconite* (*Aconitum napellus*) has been latterly employed as an antiphlogistic agent, especially by the homœopathic school; but the statements of its virtues as a remedy for inflammation are entirely vitiated by the smallness of the doses, by which the beneficial effects are said to have been produced. Writers have gravely asserted, that they have witnessed the most striking benefit to result from administering a few drops of the thirtieth, and even the two thousandth dilution, and claim that it may be substituted with perfect safety for blood-letting, antimony, and the other antiphlogistic agents. No physician who values the life of his patient will place the slightest confidence in these assertions, however confidently made, but in all serious cases of acute inflammation will resort to those well-known and established antiphlogistic remedies which, if suitably timed, will rarely disappoint his expectations. The late researches, however, of Dr. Fleming, of Edinburgh, would seem to prove that *aconite* possesses powerful antiphlogistic virtues, and is calculated to be of great value in all cases where there is inordinate activity of the circulation; that it is, moreover, calmative, anodyne, and antispasmodic. Dr. F. shows that, when given in an over-dose, it is a directly *sedative poison*, producing death in three forms: 1st, by a powerfully sedative impression on the nervous system; 2d, by suspension of the respiratory function; and, 3d, by syncope. Dr. F. also maintains, that it acts solely by direct transmission with the blood to the part affected. The good effects of *aconite* as a local remedy in different forms of *neuralgia* have long been known; its powers as a general antiphlogistic agent remain to be confirmed by farther experiments.]

a cloth wrung out of hot water, over the situation of internal or deep-seated inflammations, it produces an almost immediate effect. But friction during ten or fifteen minutes with the cold liniment will give rise to erubescence, sometimes to exudation, and more or less decided relief. In acute cases, the former mode of application may be adopted; but in chronic or sub-acute inflammation, particularly when alteration of structure has taken place, repeated frictions with this liniment, short of inflaming the skin, are often to be preferred. When the irritation produced by it gives rise to vesication or abrasion of the cuticle, the parts soon heal; but it is frequently of service to continue this effect for some time by the repeated or prolonged use of the application.

220. *Blisters* may be employed as counter-irritants in three modes: 1st, as rubefacients; 2d, as simple and slight irritants; and, 3d, to procure a puriform secretion from the part. In acute inflammations they ought not to be prescribed until blood-letting has been carried as far as circumstances will permit; and in early periods of the disease they should not be applied longer than seven or eight hours, and a warm bread and water poultice should be placed over the part to promote the vesication, and to prevent the irritation sometimes consequent on them. It will occasionally be advisable to place tissue paper between the blister and the surface. On *children*, blisters ought not to be applied longer than from three to six hours, and warm poultices should generally replace them, and be renewed frequently. For sub-acute and chronic inflammations, or for the advanced stages of the acute, blisters may be prescribed for a longer period, and sometimes with the intention of procuring a sero-puriform discharge from the blistered surface.

221. *Warm pediluvia*, the *hip bath*, and the *semicupium* are often useful modes of derivation when the head or the thoracic viscera are affected, or when it is desirable to excite the uterine discharge. Their effect will generally be promoted by the addition of mustard and of common salt to the water. But in acute inflammations the temperature should not be too high, or such as may heighten the general vascular action; they also ought not to be resorted to until depletion and alvine evacuations have been duly practised. Besides these, there are other substances sometimes used to produce counter-irritation and derivation, as *croton oil*, the powder or tincture of *capsicum*, bruised *garlic*, and scraped *horseradish*. They quickly produce a rubefacient action, when applied on the skin, but are not so efficient in the severer cases of acute inflammation as those previously noticed; they are all, however, often of service, particularly in the slighter forms of the dieases that are attended by acute pain. Besides these, *cupping* with scarification, and *dry cupping*, are serviceable modes of derivation in the sthenic forms of phlegmasia.

222. The foregoing modes of counter-irritation are most serviceable in recent, acute, or sub-acute inflammations. Those which are about to be noticed act chiefly as suppurants, and are most suited to the chronic states, or to the more advanced stages, or rather to certain of the consequences of the acute and sub-acute forms of inflammation. They consist chiefly of ointments or plasters containing the *potassio-tartrate of antimony*, or *cantharides*, or *savine*; the decorticated *bark* of the *mezereon root*, moistened in water or vinegar, and applied to a small portion of the cutaneous surface; *croton oil*, either alone or suspended in twice the quantity of camphor or soap liniment or olive oil; *issues* and *setons* of various forms and kinds; *moxas*, and the *actual* and potential *cauteries*. The exact circumstances requiring either of these means in preference to others are so numerous—the choice of them depending so entirely upon the seat, peculiarities, and stages of the disease, upon the constitution and diathesis of the patient, and upon the other remedies employed—that no general rules can be stated for the guidance of the inexperienced in this respect; the powers of observation, experience, and views of the practitioner must be his chief guide in the adoption of these as well as of many other means of cure.

223. It has been very justly remarked by my early friend and former colleague, Dr. DUNGLISON, in his very judicious observations upon the use of revellents in the phlegmasiæ (see his excellent work, entitled *General Therapeutics, or Principles of Medical Practice*, &c., 8vo. Philad., 1836, p. 363), that when we are desirous of maintaining a succession of revulsions, or a constant revulsion, we employ either repeated blisters, or keep the blistered surface discharging by applying some of the other means just mentioned. Tartarized antimonial ointment is well adapted for chronic inflammations, as of the lungs, because, while the pustules, induced in any one part of the exterior of the thorax, or elsewhere, are going through the stages of increment and maturation, a fresh crop may be elicited on some other part of the chest, and thus a succession of irritations can be developed which is more beneficial than one that is more permanent.

224. It is of importance to determine the *extent of surface* to be affected by a revulsive application. This is not always so easy a matter as may be supposed; for, if the vital conditions be affected by it in a very limited extent of surface, the morbid action, intended to be remedied, may be entirely uninfluenced by it; and, on the other hand, if a very large surface be irritated, constitutional disturbance will be thereby excited; or that depending upon the primary disorder, as well as the disorder itself, will be aggravated or perpetuated. As to the *time* during which the counter-irritation should be maintained, but little can be stated, for it must depend almost entirely upon the circumstances of the case. On this topic, Dr. DUNGLISON remarks, that it is chiefly when the diseased action has been prolonged for a considerable period, and in affections of a neuralgic kind, that sudden and violent revulsions are productive of the most marked advantage. In the different phlegmasiæ, revulsions which implicate a greater extent of surface, and are more prolonged in their action, are decidedly preferable. In the former cases, moxas and the cauteries may be employed; in the latter, rubefacients and vesicants.

225. The permanence or remittence of the counter-irritation deserves consideration in every case for which this means is prescribed.

In most of the phlegmasiæ, remittent revulsion is more serviceable than a prolonged or permanent revulsion. Dr. Dunglison justly observes, that when an artificial irritation, accompanied or unaccompanied with increased secretion from the part, has been established for some time, it ceases, in a great measure, to be a morbid condition, and cannot be arrested without an inconvenience or risk to some organ predisposed to disease; but if a succession of irritations be produced, the system never becomes habituated to them, and the repetition of the irritation, after a short period, is as beneficial as at first. A succession of vesicants, therefore, is to be preferred to a more permanent application, setons and issues losing much of their beneficial influence in the latter periods of their employment.

266. Broussais and many of his followers have contended that revulsive irritations should be stronger than the morbid action they are intended to replace, otherwise they tend to increase the latter; but although it is manifestly necessary to reduce the inflammation as much as possible by depletions, before counter-irritants are prescribed, yet great good will result from the judicious use of them. There are, also, several that may be very safely employed early in some of the phlegmasiæ, and even before depletions have been practised, as the turpentine epithem, liniments, &c. (§ 201, 219). I therefore agree with Dr. Dunglison in believing that good will be derived from revulsions in appropriate cases, even should they fall short of the precise degree necessary for completely putting an end to the disease for which they were prescribed.

227. The *situation* to which revulsants or counter-irritants should be applied, relatively to the seat of inflammation, is deserving of attention, especially as a contrariety of opinion exists on the subject. And yet the very terms here used ought to guide the practitioner to the application of them to parts which are not supplied with branches of the same nerves and blood-vessels as proceed to the seat of disease. Much, however, should depend upon the nature of the adopted revulsant; for the turpentine epithem or embrocation will never be injurious, but generally beneficial, however close it may be applied to the inflamed organ. But it is different with blisters and other counter-irritants. I cannot agree with Dr. Thomson's and Dr. Chapman's recommendation to place these "as near as possible to the affected part." I have often seen mischief result from the early application of a blister to the scalp in meningitis and encephalitis, and to the throat in laryngitis and tracheitis. When, however, the inflammation is of an asthenic or adynamic kind, or when the sthenic form has given rise to effusion, blisters, as well as several other counter-irritants, may generally be applied close to the diseased organ. Yet, even in these circumstances, exceptions to the rule are not few. The choice of situation must, therefore, depend upon the seat and character of the phlegmasia and other peculiarities of the case; precise directions respecting it can be given only when discussing the treatment of particular inflammations. In all cases the choice should be guided, as M. Bouillaud remarks, by sound physiological principles; for they only can render this mode of practice more certain than it has hitherto been, and prevent the inconveniences which often follow it.

228. It has been already stated that bloodletting, both general and local, may be so instituted, in several of the phlegmasiæ, as to derive from the seat of disease. The older writers paid much attention to this method of depleting. Bleeding from the saphena vein, the feet and legs being immersed in warm water, was often prescribed for phlegmasiæ of the viscera, and particularly when consequent upon suppressed evacuations; and bleeding from the vicinity of the anus by leeches is generally adopted by foreign physicians for inflammations of the liver, stomach, &c. Indeed, to derive the impetus of the circulation from the seat of the phlegmasia by vascular depletion, by cathartics or other evacuations, and by counter-irritants or other revellents, both internal and external, must always be a principal indication of cure in this class of diseases.

229. *μ. Of applications to the inflamed part itself*, there are some that require a particular notice. They may be all comprised and considered under the following modes of operation: 1st. Those which reduce the temperature, and thereby remove one cause of morbid irritation and of vascular expansion. 2d. Those which soothe the morbid sensibility or diminish pain, either by their influence upon the affected nerves, or by diminishing the tension, rigidity, or pressure of parts. 3d. Those which constringe the expanded capillaries, restore their lost tone, and prevent the stagnation of the blood or promote the circulation in them; and, 4th. Those which protect the part from external irritants, &c. It is obvious that many local applications produce benefit by acting in more than one of these modes; but still they may be referred to one or other of these especially. Moreover, many internal means of cure act upon the part affected, particularly in visceral phlegmasia, in one or other of these ways. As *topical means* are applicable chiefly to external inflammations, which are generally viewed as belonging to the province of the surgeon, my remarks respecting them will be as brief as the importance of the subject will permit; yet it must not be overlooked, that most external inflammations, particularly when spontaneous, are merely symptomatic of constitutional disorder—are only the external manifestations of visceral or general disturbance, or of hereditary vice; that they all react upon the frame through the medium of the organic nervous and vascular systems; and, consequently, that, while local remedies form only a part of the treatment required, the rest being employed with reference to the internal and constitutional affections, the entire treatment, even in the external phlegmasiæ, is more strictly medical than surgical, if, indeed, the distinction should be at all entertained.

230. (*a*) *Of those applications which directly reduce the temperature* some notice has already been taken (§ 214). They have generally the effect, not only of removing a principal cause of excitement and irritation, but also of constricting the morbidly expanded vessels. *Cold applications* are, however, often injurious, and consequently inappropriate or hazardous, whenever the external inflammation is merely the

outward expression of internal or constitutional disorder, as in gout and erysipelas; they are less so, however, in sthenic than in asthenic or specific inflammations; for in the sthenic phlegmasiæ the vital energies are capable of resisting their sedative influence, and the suppression of the local affection rarely endangers internal viscera. But in the other kinds of inflammation the repulsion of the external affection often caused by these applications is frequently followed by serious internal disease. In such cases, the source of mischief is in the frame, and in some important or vital organ; and when the effects are prevented from appearing externally, they often break out in some internal viscus.

231. Of the numerous *cold applications*, there are few which are preferable to the *solution of the di-acetate of lead*, inasmuch as it combines astringent with cooling and sedative properties. But this, as well as the common *cooling* or *evaporating lotions*, and *cold* or *tepid water-dressings*, should be suited to the intensity of the inflammations, and be used unremittingly until the local affection is subdued; for if employed only at intervals, or if at all intermitted, reaction will take place in the inflamed part, and the disease will be thereby aggravated, or, at least, perpetuated. We observe this in the treatment of *scalds* by cold applications, when used in this latter mode. When the inflammation is of a specific or asthenic kind, and when it is attended by great tumefaction and excessive pain, or when cold applications do not give relief to the pain in a short time, they ought either not to be employed at all, or not to be continued, but give place to very different means. Also, when they produce general chilliness, they ought not to be persisted in.

232. (*b*) *Applications which soothe the morbid sensibility* are, perhaps, more generally appropriate, and are certainly less dangerous in the symptomatic or specific phlegmasiæ just alluded to, than those which are cold. They all more or less diminish the tension of rigid and unyielding tissues, lessen pressure on sensitive parts, and have an emollient and soothing effect. *Moist warmth*, employed in various ways, but especially in the form of *steam*, *simple and medicated*, and of *fomentations*, *poultices*, and *warm baths*, also either simple or medicated, &c., is the principal agent by which the physician or surgeon produces these effects. *Steam*, or warm aqueous vapour, has lately come into notice in the treatment of inflammations; and we are indebted to Dr. MACARTNEY and Dr. WILSON for a knowledge of its virtues in respect of its topical external use; for as regards its internal employment by *inhalation* in affections of the respiratory organs, it has been long prescribed. (See ASTHMA, and BRONCHI—*Inflammations of.*) In the form of the vapour bath it has also been generally used, particularly in circumstances already noticed (§ 204). By very simple, yet suitable appliances, *steam*, either of water alone, or of water containing various *narcotic* or *emollient herbs* or *extracts*, or *camphor*, or *acetous* or *terebinthinate substances*, may be brought in contact with, or entirely surround the seat of inflammation. It may likewise be *inhaled* into the lungs for the affections referred to, either in its simple or medicated states. When employed externally, and particularly to a limited extent of surface, it should be continued for a very considerable time, and at a somewhat higher temperature than when inhaled. The substances, also, whose fumes are conveyed in the vapour or steam, may be used in much greater quantity when applied thus externally and locally than when prescribed internally. *Fomentations* and *poultices* containing emollient, narcotic, or other medicines, are also efficacious, not merely by the moist warmth they afford, but, in great measure, by the impression made upon the nervous tissue by the particular medicinal substances they contain. The same remarks apply to medicated warm baths.

233. It is principally for inflammations attended by excessive pain, by much constitutional irritability, by a very frequent and irritable pulse, and depressed vital powers, that the warm and soothing applications now mentioned are required. Hence they are generally appropriate in the specific and asthenic inflammations, and in them especially afford very great relief, particularly when brought in aid of judicious internal treatment and suitable regimen, and employed early in the disease.

234. (*c*) Applications which constringe the expanded capillaries, restore their lost tone, and prevent the stagnation of the blood, or promote the circulation in them, are suitable to certain states of the advanced stages, and to some of the consequences of sthenic inflammation. They are also appropriate to most of the specific and asthenic phlegmasiæ from their commencement. When the former proceeds to ulceration, and especially if this assume a spreading or phagedenic form, the more energetic astringents, as the various *turpentines* and *balsams*; certain *metallic salts*, particularly solutions of the sulphates of zinc, of copper, iron, &c., of the nitrate of silver, and of the acetates of lead, zinc, &c.; the dilute *mineral acids*; solutions of the *chlorinated soda*, of the *chloride of lime*, and of the *chlorate of potash*; various *vegetable astringents* and *tonics*; *creasote*, *camphor*, the *vegetable acids*, &c., are severally beneficial in such circumstances, when suitably prescribed, and combined with other appropriate means—in some instances, with narcotics, and in others with mucilaginous or albuminous substances—occasionally in aqueous vehicles, and sometimes in unguents, cerates, &c. It is chiefly, however, when the states or consequences of inflammation just noticed are external, or near the surface, or within reach, that applications containing any of these are found useful; yet even when seated in internal surfaces, as in the intestinal and respiratory, they are occasionally beneficial, employed either in the form of draught, pill, and enema, or by means of the inhalation of aqueous vapour partially charged with the fumes of some of them. Although it is chiefly for the advanced stages or consequences of asthenic inflammation that astringent substances are required, yet the early and acute stages are also sometimes benefited by them, however stimulating or irritating they may seem to be. Thus, in scalds, and in certain states of burns, the application of a cloth wetted with spirits of turpentine will generally not merely afford relief, but hasten resolution of the inflammatory action. In such cases it may be truly said, with SHAKSPEARE, that,

"One fire burns out another's burning."

235. (*d*) Substances which protect the inflamed surface from the irritating influence of the air, and of the exhalations floating in it, are extremely beneficial in all cases in which the part is abraded or its continuity injured. They are, however, less useful when they prevent the morbid secretion of the inflamed part from being discharged. In most cases, therefore, they should be so employed as to prevent any accumulation of this secretion from taking place, whereby the surrounding tissues might be contaminated. Most of these substances are advantageously made the vehicles of astringent or detergent medicines, thereby diminishing the discharge by constringing the extreme vessels, as well as excluding a chief cause of irritation, and of the consequent morbid secretion. The principal advantage derived from plasters, cerates, ointments, &c., is owing to the exclusion of the air by them from the abraded or divided surface. In many cases of injury, the fibrinous lymph exuded from the extreme vessels, by coagulating over them, protects them from irritation; and were this natural protection more frequently allowed to remain, and confided in, inflammation would less frequently supervene on these cases than it otherwise does. The albuminous exudations formed on superficial ulcerations and inflammations of exposed surfaces protect them in a similar manner, and dispose them more readily to heal; and if the inflammatory action should at any time be exasperated, so as to give rise to an increase of the morbid secretion or to the production of pus underneath the protection thus formed, the mischief will often soon subside and the secretion become absorbed, the parts healing under the scabs, or dried lymph or albumen covering them. Superficial sores, when protected by the *white of egg*, often heal underneath; and dressings with this substance, by entirely excluding the air, are often more serviceable in preventing inflammation after incised wounds and in promoting union than any other. Strong solutions of the *nitrate of silver*,* or of *sulphate of copper*, or *sulphate of zinc*, or other *astringents*, applied to ulcerating surfaces, not only excite the organic nervous tissue, and constringe and give tone to the exhausted extreme vessels, but they likewise coagulate the albuminous portion of the secretion, and thereby protect the part against the irritating influence of the air. They also change the morbid secretion, causing it to assume a more healthy character. Substances which either simply protect a raw inflamed surface, or act in the more complex manner just mentioned, are especially serviceable in cases exposed to the influence of impure air, whether the impurity proceeds from terrestrial exhalations or from animal emanations, as in the wards of a hospital, or in close, low, or crowded habitations.

236. ii. Treatment of Asthenic Inflammation.—When phlegmasia presents the asthenic form, the treatment should be very different from that recommended above. The states of organic nervous power and of vascular action differ from those attending the sthenic conditions; and as the differences are great, so should the indications of cure, and the means employed to accomplish them, be different. As all the modifications of asthenia depend chiefly upon two classes of circumstances—upon depressed conditions of the constitution, and weakened functions of the viscera concerned in assimilation and excretion, and upon the sedative, poisonous, or septic nature of the exciting causes—so all the indications of cure ought to be determined, and the remedies selected with strict reference to these circumstances. If the local phlegmasia is associated with, or consequent upon general asthenia or debility, vital power must be augmented by suitable means, otherwise the local disease will more readily terminate unfavourably, especially if it exist in much intensity. If, in addition to general or constitutional adynamia or asthenia, there be impaired excretion, and consequently accumulation of effete elements in the blood, or deterioration of it, not only must vital energy be supported or roused, but also the excreting or eliminating functions must be excited, and means employed which may correct or change the morbid tendency or conditions of the blood; for if these ends are not attained, the structural lesions which the inflammation rapidly induces, instead of being arrested, or terminating in spontaneous resolution, would be rapidly accelerated, and themselves become the source of farther local disorganization, and of constitutional contamination.

237. Asthenic inflammations, whether depending upon original, acquired, or accidental states of the frame, and of the vital organs, or proceeding from specific causes, require a treatment directed more strictly to the conditions of vital power and function—to the constitutional affection and the existing visceral disorder—than to the local disease; and they, moreover, require this kind of treatment much more than the forms of phlegmasia already considered. In the latter, the constitution and the vital organs have generally been either unimpaired or not materially affected, before the local disease originated and drew them within the circle of its sympathies; in the former, either the constitution, or some important viscus, or both, have been seriously deranged before the inflammation appeared; this latter being either the consequence of, or an accidental contingency upon such derangement, and depending upon it in its subsidence as well as in its appearance. Even when the asthenic forms of inflammation more especially proceed from specific or septic causes, still very much of their local characters and of their constitutional effects depend upon pre-existing states of vital energy and of the assimilating and excreting functions. To these, in their antecedent as

* [The nitrate of silver deserves particular mention as a local antiphlogistic application, especially in the erysipelatous forms of inflammation, and the different species of cynanche. Applied in substance, or saturated solution, to the sound skin bordering the inflamed part in erysipelas, it speedily checks the extension of the disease, and in the inflammatory affection of the throat which complicates scarlet fever, there is no local remedy which exerts an effect so speedy and decidedly beneficial as this. In chronic laryngitis and bronchitis, unconnected with tubercular disease of the lungs, an application of a solution of the nitrate to the larynx (40 or 50 grains to the ounce), after the manner recommended by Trousseau and Belloc, will often effect an alleviation, if not an entire removal of the disease.—(See *New-York Journal of Med. and the Collateral Sciences*, vol. v., 1844.) There is scarcely any form of local inflammation in which this article will not prove a useful topical remedy.]

well as in their existing conditions, the attention of both physician and surgeon ought to be mainly directed; and neither the one nor the other will discharge his duties if he does not connect the forms and changes of the local affection with the constitutional disorder and the visceral derangements, and treat each of them with strict reference to the rest.

238. Although *indications of cure* should not be followed in succession, nor acted upon individually, and without regard to their joint operation—although attempts at accomplishing one intention, without endeavouring to attain others at the same time, should not be made in asthenic any more than in sthenic inflammations—yet it will be necessary to have just ideas as to the principal objects to be attained, in order to arrive at a successful issue, and as to the importance and applicability of them severally in the treatment of each particular case. These *objects* or *intentions* should be entirely based upon the characters assumed by the constitutional commotion, by the visceral disorder, and by the inflammation—the seat and cause of the phlegmasia, and the circumstances immediately connected with the patient, being also taken into account. Upon these, the activity with which each indication of cure should be pursued, and the importance assigned to one or more of them, should chiefly depend. Influenced by these considerations, and by the phenomena and progress of asthenic phlegmasiæ, the physician, in their treatment, will propose to himself: 1st. To promote organic nervous power, and thereby to enable the constitution to resist the progress of the local disease; 2dly. To preserve or to restore the healthy state of the circulating fluids, and the crasis of the blood, by promoting the excreting or depurating functions, and by other appropriate means; and, 3dly. To assuage the urgent symptoms referrible either to the local malady, or to the constitutional affection. The means which most efficiently fulfil the *first* of these intentions will generally also promote the attainment of the second and third; and whatever has the effect of accomplishing the *second* will also most materially advance the other indications.

239. *A. The constitution will generally be enabled to resist the local progress of the malady*, by whatever increases the tone or energy of the organic nervous system, through the medium either of the digestive canal, or of the respiratory organs—by means of appropriate tonics and stimulants, and by a dry, pure, and temperate air, duly renewed. All asthenic inflammations have a tendency to spread or to extend themselves with a greater or less rapidity, and to terminate unfavourably; the changes that successively arise tending to gradual disorganization, or to more immediate sphacelation. Unless under the influence of agents which rally the constitutional powers, they seldom or never show a disposition to spontaneous resolution, as often observed in sthenic phlegmasia. The only exceptions to this rule are met with in those asthenic inflammations which constitute a part of specific constitutional maladies; and these are mere symptoms, or parts only, of these maladies, and are generally co-ordinate with, and dependent upon them in their rise, progress, and decline. This tendency to spread, and to give rise to a succession of unfavourable changes, constitutional as well as local, requires agents possessing powers of sufficient activity to meet the intensity of the disease. As this tendency depends upon depressed organic nervous energy and deficient vascular tone, as shown above (§ 58); and as the permanent fluidity of the effused fluids, and their infiltration and contamination of the surrounding tissues, depend upon these pathological states, it is obviously requisite to employ such means as attentive observation and enlightened experience have proved to be most efficient in removing them. All parts which are the seat of asthenic inflammation rapidly lose their vital cohesion or tone; and this loss is participated in, not only by the extreme vessels giving rise to a copious morbid effusion, but also by the tissues affected. The chief pathological conditions, from which all the consecutive changes have been shown to proceed (§ 162, *et seq.*), manifestly require an energetic recourse to those means which will enable the constitution to resist the progress of the local mischief. Where cellular or adipose tissues are implicated, the extension of disease, and even of disorganization will be rapid, if organic nervous energy be not promoted, and if vascular action in the seat of inflammation be not changed by suitable remedies. In such cases, the constitution must be enabled, as John Hunter ably contended, to form coagulable lymph, either in or around the inflamed part; or, in other words, to change the fluid and often septic matter effused in the areolæ of the tissues, that extends the mischief by infiltrating and contaminating them, into coagulable lymph or albumen, whereby these areolæ may be rendered impervious to the more fluid part of the effused matter, and the progress of the local malady may be more readily limited.

240. The *principle* of treatment in asthenic inflammations being established, the *means* by which it may be most successfully carried out in practice will be readily found; although the application of these means, appropriately to the varying phases of individual cases, requires great discrimination and care. In the truly asthenic forms of phlegmasia, the principle contended for must be acted upon with decision, and without wavering or temporizing. In the treatment of them, doubt or hesitation is fraught with danger; and proceeding, as either generally does, from ignorance of the true source and relations of the local malady, there will be every reason to fear that much of both positive and negative wrong will be farther perpetrated. The ignorant are usually presuming, and the half-informed self-sufficient. In other professions and avocations the evils produced by both are comparatively trivial; but in the practice of medicine their consequences are of fearful and immeasurable importance to humanity. I have seen numerous cases of asthenic inflammation die in succession, without the occurrence of a single instance of success to lull the suspicion that true principles of practice had not been adopted; and yet the same principles were blindly pursued in each successive case. In a country where the most trivial invasion of the rights of property is visited by the most condign punishment, human life may be sacrificed to an extent that more than rivals both the pestilence and the sword, by ignorant pre-

tenders to medical knowledge—by the totally uneducated as well as by the half instructed—and not merely with perfect immunity from punishment, but actually with the protection of the government, that protection being virtually the most complete for those whose ignorance is the greatest! This sacrifice of human life, be it farther recollected, is constant and unceasing—not occasional only, or at long intervals, as that caused by epidemics, pestilences, and wars. It was said, upward of two hundred years ago, by a celebrated archæologist (Sir H. SPELMAN), "that while everything else had risen in nominal value in England, the life of man had become continually cheaper." What would he have said had he lived in the present day?

241. The *means* by which the indication or practical principle above contended for is to be fulfilled must necessarily vary with the circumstances of the case; but the decoction of *cinchona*, or the infusions of *cascarilla* and of *gentian*, &c., with the *alkaline carbonates* (F. 381, 385, 387, 388, 445, 869), are generally beneficial, especially when aided by warm aromatic tinctures or spirits. When the pulse is very quick, soft, and weak, and when the patient is physically and morally depressed, the *chlorate of potash*, *serpentaria*, or other stimulants, may be added to the above (F. 415–417, 437–439). In these cases, *camphor* in full doses, the preparations of *ammonia*, and *capsicum*, or other spices and aromatics (F. 845, 852), may likewise be prescribed. In all asthenic inflammations, the excretions, and the fluid effused in the diseased tissues, are more or less acid—a state which is most readily corrected by the alkaline carbonates, conjoined with tonics and aperients. In many cases, however, the preparations of *chlorine*, particularly the *hydrochloric acid*, the *hydrochloric æther*, and *chlorinated soda*, prescribed with tonic vegetable infusions or decoctions, and with camphor, aromatics, &c., are equally beneficial with the foregoing (F. 847, 848).

242. *B.* But, in order to promote the powers of life, and thereby to enable the vessels of the diseased part to form coagulable lymph, whereby the progress of mischief may be arrested, it is necessary, not only to excite the organic nervous system, but also *to depurate and to correct the circulating fluids by appropriate medicines*. This intention will be fulfilled chiefly by promoting the excreting functions by mild *purgatives*, conjoined with *tonics* and *aromatics*, as the compound *infusions of gentian and senna* with the alkaline salts (F. 266), the compound *decoction of aloes* with warm aromatic tinctures or spirits, or the infusions of *rhubarb* and *cinchona* (F. 55, 387, 433), or other similar remedies (F. 53, 215, 216, 872). In the intervals between the exhibition of these, tonics and stimulants should be selected, and given in doses and combinations suitably to the seat and urgency of the disease. If the purgatives just mentioned act insufficiently, a dose of oil of turpentine and castor oil (about half an ounce of each) may be taken on the surface of milk, or of any aromatic water (F. 216), and enemata containing the same oils (F. 135, 151), administered according to circumstances. If the biliary secretion be suppressed or interrupted, *calomel* or PLUMMER'S pill may be given at bedtime with *camphor*, and a draught containing the oils, or either of the above purgatives, may be taken in the morning. The combination of the mild alkaline salts, or of the chlorate and carbonate of soda (F. 439), with the foregoing tonic or other medicines, will generally correct the circulating fluids, diminish the contaminating influence of the matter effused in the seat of disease, and farther promote the fulfilment of the present indication.

243. *C.* From the commencement of the treatment it is often requisite *to mitigate the more urgent, local, and constitutional symptoms*.—*a.* The remarkable pain and tumefaction of the inflamed part are best relieved by anodyne fomentations, by warm bread and water poultices, or by the local application of simple or medicated steam. In the more complete forms of asthenic inflammation, no advantage will accrue from the application of leeches to the inflamed part; although a recourse to incisions of the integuments, as recommended by MR. A. COPLAND HUTCHISON and others, will often be of service when cellular and adipose parts are the seat of disease, and the tension is very great. I have seen also the application of a cloth moistened with oil of turpentine have a very remarkable effect both in mitigating the pain and in lessening the tension and tumefaction. It should be applied warm, and covered with wash-leather or oil-skin to prevent evaporation and cold. In several cases, where the swelling has been most extensive—the whole limb to the trunk having been affected—I have seen it subside very quickly after a decided recourse to the internal and external treatment here recommended. In most of these cases, the tone of the vessels has been rapidly restored, congestion of them removed, and the effused fluid absorbed, without coagulable lymph having been formed, or suppuration having supervened, excepting in some instances at the point of injury, or where the disease originated. When this treatment is early resorted to, not only is the progress of the disease arrested, but also much of its more immediate effects is removed without the lesser evil, the formation of fibrinous lymph, for which JOHN HUNTER contended, having taken place.

244. *b.* At advanced stages of asthenic phlegmasia, more frequently, and even at early periods occasionally, excessive *pain* and general *irritability* call for a prudent yet decided recourse to *narcotics*. In these cases a lowering treatment will neither mitigate the pain nor diminish the other symptoms, but, on the contrary, increase them all, and render still more rapid the already quick and irritable pulse. Here *opium*, or the acetate or hydrochlorate of *morphia*, or *hyoscyamus* in large doses, must be resorted to. But these ought always to be conjoined with *camphor* and some of the *aromatics* or *spices*. When *delirium* appears in the course of asthenic inflammation, depressing remedies are generally injurious; but the narcotics just named, and combined as now advised, will be of the greatest benefit, particularly in conjunction with the restorative treatment above recommended, and after the excretions have been duly evacuated by appropriate means. (See art. DELIRIUM.)

245. *c.* When asthenic inflammations are attended by general *vital depression without reaction* (§ 62), the most energetic stimulants, tonics, and restoratives are necessary; and if de-

lirium supervene, camphor, ammonia, and opium, with warm aromatics, should be freely exhibited.

246. *d.* When organic nervous or *vital power is depressed, although much general vascular excitement exists* (◊ 63), the pulse being rapid and weak, similar means to the above are requisite, but in less energetic doses. Camphor, with the narcotics already advised, and aromatic spices, mild stomachic purgatives, occasionally aided by a draught and an enema containing turpentine and castor oils, are also most efficient remedies.

247. *e.* In cases characterized by *depressed vital power, acute nervous sensibilty, and cerebral disorder* (◊ 64), the means just recommended are urgently called for; but the narcotics and camphor should be prescribed at an early period of the disease, and in large doses. The effusion of tepid or warm water on the head, according to the temperature of the part, may be employed. Medicated vapour or warm baths may also be tried, and medicated steam (◊ 232) may likewise be applied to the local malady.

248. *f.* When there are *excessive irritability, acute pain, and vascular excitement* (◊ 65), the internal and external treatment just prescribed, but modified according to the stage and particular features of the disease; a combination of camphor, calomel, and opium; stomachic aperients, with the alkaline salts, and an occasional recourse to turpentine and castor oil, in the form of draught or enema, are chiefly to be relied upon.

249. *g.* Great *irritability of stomach* may occur at an earlier or later period of asthenic inflammations, when attended by any of the forms of constitutional commotion just referred to. When this is the case, every endeavour must be used to allay it. Warm aromatics, or spices and stimulants, with small doses of opium, will generally have this effect in the less urgent cases, particularly when aided by the assiduous application of the warm turpentine epithem over the region of the stomach, and by the administration of stimulant and antispasmodic enemata. In such circumstances, those articles which are most grateful to the stomach should be selected, and everything of a depressing nature avoided. Effervescing medicines are seldom useful, especially if this very unfavourable symptom occur at an advanced period of the disease. More advantage will accrue from small and frequent doses of ammonia, camphor, capsicum, and other warm aromatics or stimulants—from small quantities of burned brandy, from strong and highly-spiced negus, and from other restoratives of small bulk—than from cold, relaxing fluids. I have seen much benefit derived in these cases from moderate doses of creasote, or of cajeput oil, in suitable vehicles, or in the form of pills made with any absorbent substance.

250. *h.* When disorganization of the inflamed part has commenced, or is advanced, *local means* of an energetic kind may be prescribed if they can reach the part in any way; if they cannot, the constitutional treatment, aided by suitable diet and regimen (◊ 260), and by a pure, dry air, must be energetically but carefully enforced. As to the topical applications which may be prescribed in these circumstances, some incidental observations have been already offered; but it may be farther stated, that those substances which *constringe* or *impart tone* to the affected vessels and tissues should be employed, and that those which possess this as well as an *antiseptic property* in the most marked degree, should be preferred. Strong decoctions or infusions of cinchona, or oak barks, the terebinthinates, the solution of chlorinated soda, or of the chlorate of potash, or of the chloride of lime, or creasote, may be severally employed in the form of either lotion or injection, or on the surface of warm poultices, or in any other mode more appropriate to the peculiarities of the case.

251. *i.* During the treatment, especially of the advanced stages of asthenic phlegmasia, the *absorption of the morbid matter* from the seat of disease into the circulating fluids ought to be prevented by every possible means. This object can be obtained only by giving a free exit to whatever of this matter may have accumulated, and by preventing any collection of it from taking place. The internal treatment, which I have advised, will also have a most decided influence in preventing the absorption of it, and will enable the powers of life to resist whatever morbid impressions it may make in the seat of disease. The marked influences of all depressing agents in promoting the absorption of morbid fluids, and the powers of tonic and restorative means in preventing absorption, and the consequent contamination of the circulating fluids, as well as in enabling the constitution to resist the natural tendencies of these fluids and to throw them out of the economy, have been fully shown in the articles Absorption (◊ 15, *et seq.*), Abscess (◊ 62), Blood (◊ 143, 157, *et seq.*), Cellular Tissue (◊ 35, 36), and Veins—*Inflammation of.* The constitutional and local treatment fully described when discussing *Typhoid* and *Putro-adynamic* Fevers, *Diffusive Inflammation of the* Cellular Tissue, and Gangrene, is generally suitable to asthenic inflammations.

252. iii. Treatment of Inflammations intermediate between the Sthenic and Asthenic, &c.—Although inflammations generally present characters belonging more especially to the sthenic or asthenic forms, yet they occasionally present features appertaining to both, and consequently they require a somewhat different or modified treatment from what has been here assigned to each of the principal forms. Like all febrile diseases, inflammations also change their types and characters, under the influence of *climate, season,* and *epidemic constitution*; and hence, at particular periods, they not only present *sthenic* or *asthenic forms,* but also *transition* or *intermediate states.* Nor ought it to be forgotten that these transition or intermediate states, as well as the more truly asthenic forms, are either so dependent upon, or associated with certain conditions or affections of the constitution—often of the organic nervous and circulating systems—as to impart to the local malady many of its peculiar features. This is very manifestly shown in those inflammations which I have denominated *specific,* as arising from certain specific, or infectious, or poisonous causes—in *erysipelas, puerperal inflammations, dysentery, smallpox, scarlatina, measles, syphilis,* &c.

253. *A.* Nor should it be overlooked, partic-

ularly in the treatment, that numerous morbid impressions made upon the economy, more especially by *epidemic constitution* and by *terrestrial exhalations*, modify remarkably all inflammations, and deflect them more or less from the sthenic type, to which I have sufficiently directed attention. These influences, therefore, however operating, must always be kept in view in connexion with other predisposing and exciting causes. The prevailing epidemic constitution is often sufficiently evident in its effects, however obscure in its origin and nature. The attentive observer will seldom fail of recognising it, even in its earlier appearances, particularly if the circumstances, to which I have already alluded (§ 191), be observed.

254. *B.* The influence of *malaria* or of *terrestrial emanations* on inflammations is also important, although it is less observable in this country than in many others. In the southern countries of Europe, Asia, and America, and in many intertropical regions, malaria, by its effects upon the constitution, imparts to inflammation more or less of an asthenic or adynamic character, accelerating its course, or rendering its consequences most serious. In the less intense forms of inflammation, and particularly in the more chronic forms, the constitutional affection assumes either a *remittent* or *intermittent type*. In the former case the influence of the paludal effluvia is often overlooked, or insufficiently estimated; in the latter, the local affection too frequently escapes detection, or is even never inquired after, the form of the attendant fever alone attracting notice.

255. *C.* In the *white races* of the species, and in the inhabitants especially of northern and temperate regions, the sthenic form of inflammation, and those states of the disease which more nearly approach it, most frequently occur; but in the *black* and *dark-skinned races* inflammations either assume, or rapidly pass into more or less asthenic forms. The mode of living is another circumstance which should be viewed in connexion with the variety of species in which these diseases may occur, and which is of equal importance with it in the treatment of this class of maladies. Owing to the peculiarity of organization possessed by the dark races, and to the forms which inflammations consequently assume in them, vascular depletions and other evacuations more readily exhaust the vital or constitutional powers, and are much less beneficial in the treatment of these diseases than in the white races. Hence they should be most cautiously employed in these former varieties of the species, even although the phlegmasia may present, at its commencement, a predominance of the sthenic characters; and when it appears in an unequivocally asthenic form, means energetically tonic and restorative are especially requisite.

256. *D.* Much of this intolerance of depletions and lowering remedies, in the treatment of the inflammatory diseases of the dark races, may be attributed to their low or *abstemious diet*, and to their living chiefly on *farinaceous substances*. Although the constitution and modes of living of these races thus impart a certain character to many of their maladies, and especially to those under consideration, yet they also bestow upon them a much greater immunity from inflammations than is possessed by the white and more highly-fed variety of the species. Persons who live chiefly on animal food, and particularly on simply-dressed or underdone meats, are much more liable to sthenic inflammations, and require much more copious depletions and alvine evacuations for their cure, than those who use vegetable food, or animal substances which have undergone great changes by elaborate or repeated cookery.

257. As these states of inflammation, which may be viewed as intermediate between positively sthenic and asthenic conditions, vary with these and other circumstances, so the treatment must necessarily be varied accordingly; but the several respects in which variations should be made cannot be stated with precision; they ought to be adopted conformably with the deductions, as to existing pathological conditions—local and constitutional—formed by the practitioner at the time of prescribing for them. Everything must depend upon his pathological knowledge and acumen, and upon his practical resources, appropriately applied to each case.

258. *E.* The treatment of *specific inflammations* and associations of the phlegmasia with other maladies implicating the constitution or the principal viscera, especially those just named (§ 252), requires no remark at this place. They present every intermediate feature between the sthenic and asthenic forms above described, according to the constitution and age of the patient, and to external or internal agents, existing epidemic constitution, and other circumstances by which his frame may have been, or is at the time influenced; and they consequently require an application of the principles of practice, as well as appropriation of individual means conformable thereto. But these topics will be found as fully discussed as the nature of the subject will permit, in the articles devoted to these *specific inflammations*, as well as in those on DYSENTERY, ERYSIPELAS, *the Complications of continued* FEVERS, &c.

259. IV. *The treatment applicable to* THE CONSEQUENCES *of the different forms of inflammation* either has already been noticed in the foregoing observations, or has been fully considered in the separate articles devoted to the chief of these consequences, particularly ABSCESS, GANGRENE, INDURATION, SOFTENING, &c.

260. V. The DIET and REGIMEN ought to be strictly *antiphlogistic* in the *sthenic forms* of phlegmasia. The *food* taken in the slighter and more chronic cases should be mild, farinaceous, and in small quantity. The *beverages* or *drink* ought also to be cooling and diluent (F. 588, *et seq.*). Perfect quietude of body and mind should be enforced, as tending most materially to keep down vascular action, to prevent the exhaustion of vital power, and to promote the operation of the medicines employed.

261. When inflammation assumes, or passes into an *asthenic form*, it will be necessary to support the powers of life by a restorative diet and regimen, as well as by the medical treatment recommended (§ 236, *et seq.*); but in such cases the digestive organs are always remarkably weak, are incapable of assimilating much food, and are readily disordered by whatever is difficult of digestion. The stomach should therefore be kept in humour, by allowing

that only to be taken which is craved for or most relished. Generally, in the more asthenic cases, small quantities of warm or highly-seasoned soups or broths, as beef-tea, gravy, or Mulligatawny soup, with boiled rice, &c., warm jellies, with old sherry, and similar articles, may be taken. If vital depression be great, warm and highly-spiced negus, or mulled wines, and even Champagne, may be freely allowed. In many instances, when there is much thirst, brisk bottled stout, seltzer-water with wine or milk, spruce or ginger beer, &c., may be given, and may even be made the vehicle of warm restorative medicines; but they ought not to be given until their temperature is raised somewhat above that of the surrounding air, nor should they be taken in too large a quantity at one time. In this form of inflammation especially, the patient should respire a mild, dry, and pure air. The varying phases of the disease—local and constitutional—ought to be carefully observed throughout; and whatever may occur of an unfavourable character, instantly met by energetic means.

Bibliog. and Refer.—*Aëtius*, Tetrab., iv., s. ii., c. 31. —*Paulus Ægineta*, L. iv., c. 17.—*Oribasius*, Synopsis, l. vii., c. 24.—*Avicenna*, Canon., l. iv., c., fen. iii., tract. i., cap. 1.—*Actuarius*, L. ii., c. 12, iv., c. 16.—*Autenrieth*, Handbuch der Physiologie, 1 b., s. 183.—*Bohn*, De Inflam., 4to, 1684.—*Mayswaring*, Of Pains and Inflammations. Lond., 1697.—*G. E. Stahl*, De Inflam. vera Pathol., 4to, 1698.—*Boerhaave*, De Inflammationibus in Genere. Lugd. Bat., 1708.—*F. B. Sauvages*, Inflammationis Theoria. Monspel., 1743.—*Richter*, De Inflammat. Sanguinea, &c. Halæ, 1762.—*G. A. Brambilla*, Lettera Critica—se l'Inflammazione e la Gangrene se debbono abbandonar alla Natura, &c. Milan, 8vo, 1765.—*F. Vacca*, De Inflammationis Morbosæ Natura, Causis, &c. Flor., 8vo, 1765.—*Verschuir*, De Arteriarium et Venarum Vi irritabili, &c. Amst., 1766.—*G. Fordyce*, Elements of the Practice of Physic, P. i., Fevers and Inflam. Lond., 8vo, 1767.—*Portal*, Précis de la Chirurgie Pratique. Paris, 1767.—*J. J. Winteri*, Inflam. Theoria Nova, 8vo, 1767.—*D. Magenise*, The Doctrine of Inflammation founded upon Reason and Experience. Lond., 8vo, 1768.—*De Haen*, Ratio Medendi, Par. xiv., c. 3; et Opusc. ined., Par. i., No. 26.—*J. A. Brambilla*, Von der Phlegmone. Wien., 1773; et in Journ. de Médecine, tom. lxxv., p. 521.—*J. B. F. Carrère*, Traité Théorique et Pratique des Maladies Inflam. Par., 8vo, 1774.—*J. Quarin*, Methodus medendi Inflammationibus. Wien., 8vo, 1774.—*Stoll*, Rat. Med., Par. i., p. 190; Par. v., p. 339; et Par. viii., p. 76.—*Hase*, Usu et Opii salubri et noxio in Morbis Inflammat. Lips., 1777.—*R. Hamilton*, in Med. Commun., vol. ix. Lond., 1783.—*A. Fiorani*, Saggio sulla Infiammazione. Pisa, 4to, 1784.—*Brugmann*, De Puogenia, 1785.—*A. Pujol*, Essai sur les Inflam. Chroniques des Viscères. Par., 8vo, 1785.—*White*, in Mem. of the Phil. Soc. of Manchester, vol. i., 1785.—*H. Van den Bosch*, Versuch ueber Entzündung und ihre Ausgänge. Munst., 8vo, 1786.—*Bichat*, Anatomie Génér., tom. ii., p. 496.—*E. A. Nicolai*, Theoretische und Practische Abhandlungen ueber die Entzündungen. Jen., 8vo, 1786.—*J. Moore*, On the Process of Nature in filling up Cavities, &c., 4to, 1789.—*Hartmann*, De Circumspecto Camphoræ in Morbis Inflam. Usu interno. Francof., 1787.—*Lind*, in Lond. Med. Journ., vol. viii., p. 2.—*G. Wedekind*, Allgemeine Theorie der Entzündungen und ihrer Ausgänge. Leipz., 8vo, 1791.—*J. C. Smyth*, Of the Different Kinds and Species of Inflammation, &c., in Med. Commun., vol. ii., p. 168.—*Grasmeyer*, Abhandlung von dem Eiter, &c. Goett., 1790.—*J. O. Justamond*, On Inflam. and Abscess; Surgical Tracts. Lond., 4to, 1789.—*W. Cullen*, First Lines, &c., vol. i., 8vo, 1789.—*J. G. Leigenhagen*, Beyträge zur Bericht der Entzündungslehre. Strasb., 8vo, 1790.—*B. J. Reyland*, Abhandlung von verborgenen und langwierigen Entzündungen. Wien., 8vo, 1790.—*J. C. Smyth*, Medical Communications, vol. ii. Lond., 8vo, 1792.—*J. Hunter*, A Treatise on the Blood, Inflam., &c. Lond., 4to, 1794.—*J. B. Coxe*, On Inflam. Phil., 8vo, 1794.—*Latta*, System of Surgery, vol. i., cap. 6.—*Soemmering*, De Morbis Vasorum Absorb., s. i., 2.—*Reil*, Memorab. Clin., fasc. iv., p. 167.—*Yeats*, in *Duncan's* Annals of Med., vol. ii., lustr. ii., sect. ii., a. 8.—*Brandis*, Versuch ueber die Lebenskraft. p. 126 et 133.—*Wright*, in Med. Facts and Obs., vol. vii., No. 1.—*B. Bell*, On Ulcers, White Swellings, and Inflammation, 2d edit., 8vo, 1799.—*A. P. W. Philip*, A Treatise on Febrile Diseases and Inflammations. Winch., 8vo, 1799.—*Schaak* et *Mursinna*, in Journ. de *Mursinna*, t. i., c. 2, 1800.—*J. Hunt*, On the Progress of Med. Science regarding Inflam., &c., 4to, 1801.—*J. Burns*, Dissertations on Inflammation. Glasg., 8vo, 1800; and Principles of Surgery, vol. i., p. 24, 8vo, 1831.—*G. Prochaska*, Oper. Minor. Vienn., 8vo, 1800.—*J. Bell*, Principles of Surgery (vol. i., On Wounds, Ulcers, &c.), 3 vols., 4to, 1801–1808.—*J. Herdmann*, On White Swellings and the Doctrine of Inflam. Edinb., 8vo, 1802.—*S. Perret*, Aperçu sur les Phenomènes de l'Inflammat. Par., 8vo, 1803.—*P. J. P. Portel*, Sur l'Inflam., 4to, 1803.—*Ploucquet*, De multifariis Inflam. Terminat., 4to, 1803.—*Beinl*, Von einer Eigenen, art. Lymphgeschwülst, &c. Vienne, 1801.—*Horn*, Handbuch der Medicin. Chirurgie., 1 cap.; et Klinisches Taschenbuch, 1803, No. 1; et Archiv. für Pr. Medicin, b. v., p. 274.—*Horsch*, Annalen, ii., n. 5.—*G. Baronio*, Degli innesti Animali, 8vo, 1804.—*A. Berlioz*, Propositions sur l'Inflammat., &c. Par., 8vo, 1804.—*P. Labanne*, Quelques Consid. sur l'Inflam., &c., 4to, 1804.—*G. M. Fegelein*, Versuch einer Nosologie und Therapie der Entzündungen. Bamb., 8vo, 1804.—*Hufeland*, Journ. der Pr. Arzneyk, b. vii., p. 205.—*Hegewisch*, in *Hufeland* und *Himly*, Journ. der Pr. Heilk., b. i., st. 3, p. 53.—*Most*, in *Hufeland*, Journ. der Pr. Heilk., b. viii., 3 st., p. 106.—*Neumann*, in Ibid., b. xxiii., st. 3, p. 151, and st. 4, p. 48.—*Wiedmann*, in Ibid., b. xxiv., st. 3, p. 116.—*Schaeffer*, in Ibid., 1811, Sept., p. 24.—*F. Naegele*, Beytrag zu einer Naturgeschichtlichen Darstellung der Entzündung. Dusseldorf, 1804.—*D. F. Heffter*, Doctrinæ de Gangren. Brevis Expos., 4to, 1807.—*Brera*, Annotationi Med. Pract., f. ii., 1807, p. 201.—*B. Hofrichter*, Versuch ueber das Entzündungsfieber und die Entzündung. Bresl., 8vo, 1806.—*F. J. V. Broussais*, Histoire des Phlegmasies Chroniques. Par., 8vo, 1808; Transl. by *Hays*, &c. Philad., 8vo, 1831.—*J. F. Chortet*, Traité de l'Inflammation et de ses Terminaisons. Par., 8vo, 1808.—*J. B. Serny*, On Local Inflammations, more particularly of the Eye. Lond., 8vo, 1809.—*Wendelstedt*, De Cognatione et Differentia inter Inflam. et Profluv., 1809.—*J. C. F. Harles*, Practische Bemerkungen ueber innere Entzündungen bey Kindern. Nürnb., 4to, 1810.—*Hecker*, Annalen, 1810, Dec., p. 508; et May, 1811, p. 460.—*Jno. Meyer*, Ueber die Natur der Entzündung. Berl., 8vo, 1810.—*J. Meier*, Kritische Geschichte der Entzündungen. Berl., 8vo, 1812.—*H. A. Edden*, Die Theorie der Entzünd., 8vo, 1811.—*Roux*, Mélanges de Chirurgie et de Physiologie, in Journ. de Med. continuée, 1810, Janv., p. 68.—*H. A. Goeden*, Die Theorie der Entzündung. Berl., 8vo, 1811.—*Fr. Gruithuisen*, in Gaz. Méd. Chir. de Salzbourg, t. ii., p. 129, 1816; et t. ii., p. 298, 1811; et Preface to his Organozoonomie, 8vo, 1811.—*J. M. Scavini*, Précis Historique de la Doctrine de l'Inflammation depuis Hippocrate jusqu'à nos Jours. Turin, 8vo, 1811.—*C. L. G. Leisseling*, De Gangrena, 4to, 1811.—*A. H. Stevens*, On the Proximate Cause of Inflammation. Philad., 8vo, 1811.—*John Hunter*, A Treatise on the Blood, Inflammation, and Gunshot Wounds, 2 vols. Lond., 8vo, 1812.—*T. Sutton*, Tracts on Inflammatory Affections, &c. Lond., 8vo, 1813.—*P. Pinel*, Nosogr. Phil., &c., t. i., 1813.—*J. Thomson*, Lectures on Inflammation. Lond., 8vo, 1813.—*W. Balfour*, Observat. on Adhes., &c., 8vo, 1814.—*A. Berlioz*, Propositions sur l'Inflam., 4to, 1814.—*Jacopi*, Sperienze fatti nel Instituto Clinico di Pavia nell' Anno 1812, 1813, vol. ii.—*Abernethy*, On Chronic and Lumbar Abscesses. Lond., 1815, vol. i., p. 132.—*K. H. Dzondi*, De Inflammatione Aphorismorum, lib. i. Hal., 8vo, 1814; et Patholog. Inflam., &c. Hal., 8vo, 1828.—*C. H. Parry*, Elem. of Path. and Therap., 8vo, 1815; and On the Arterial Pulse, 1816.—*C. Wenzel*, Ueber die Induration und das Geschwür. Mainz., 8vo, 1815.—*J. Delpech*, Précis Elém. des Mal. Chir. (tom. i., c. i.), 3 tom., 8vo, 1816.—*C. H. Ronnefeld*, Animadv. nonnullæ ad Doct. de Inflam., 4to, 1817.—*A. Henke*, De Inflam. Intern. Infantum Comm., 1817.—*Bricheteau*, in Dict. des Sc. Méd., tom. xxiv., p. 625; et tom. xli., p. 391. Par., 1818.—*R. C. F. Graefe*, De Rhinoplatice, &c., by *J. C. F. Hecker*, 4to, 1818.—*Nasse*, in *Horn's* Archives, &c., t. i., 1817, p. 377.—*F. V. Cassia*, Du Caractère de l'Inflam., &c., pendant la Vie et après la Mort. Par., 8vo, 1818.—*J. V. N. Hildenbrand*, Instit. Pract. Med., &c. (vol. ii., De Inflam.), 4 tom., 8vo, 1816–1825.—*Rostan*, in Nouv. Journ. de Méd., t. iii., p. 106.—*C. R. Hoffmann*, Sententiæ de Inflam. Natura. Erl., 8vo, 1819.—*J. Lizars*, in Edin. Med. and Surg. Journ., vol. xv., p. 369.—*J. Wilson*, Lectures on the Blood, 1819.—*K. F. Nietch*, Ueber Verborgenes Entzündung. Francf. a M., 8vo, 1819.—*Dokhof*, De Phlegmone, 8vo, 1819.—*C. Hastings*, On Inflam. of the Bronchiæ, with an Inquiry respecting the Nature of Inflammation, &c. Lond., 8vo, 1820.—*V. Mentaconi*, Lezioni di Nosologia e Terapia sulle Inflammazione, vol. iii. Pavia, 12mo, 1820.—*G. Tommasini*, Dell' Inflammazione e della Febbre. Pisa, 8vo, 1820.—*Eggers*, Von der Weidererzeugung. 8vo, 1821.—*G. de Filippi*, Nuovo Saggio Analitico sull' Inflamm. Milano, 8vo, 1821; rev. in Lond. Med. and Phys. Journ., vol. xlvii., p. 518.—*J. H. James*, On the Principles and Treatment of Inflam. Lond., 8vo, 1821, 2d edit., 1832.—*L. W. Sachs*, Grundlinien zu einem Systeme der Practische Med., th. i., Entzündungen. Berl., 8vo, 1821.—*C. J. M. Langenbeck*, Nosologie, &c., der Chir. Krankheiten, 3 b., 8vo, 1822–1825.—*Scholefield*, De Theor. Inflam., 1822.—*C. E. Lucas*, On the Principles of Inflammat. and Fever. Lond., 8vo, 1822.

—*C. G. Carus*, De Vi Naturæ Medicatr. in formandis Cicatricibus, pars i., 8vo, 1822.—*A. Duges*, Sur la Nature de la Fièvre, de l'Inflam., &c., 8vo, 1823.—*Gerardin*, Sur les Phlogoses Sarcopée et Osteopée, &c., 4to, 1823.—*Balling*, in Journ. de *Graefe* et *Walther*, tom. xiv., p. 42.—*Suringar*, Comm. Med. de Modo quo Natura versatur, &c., 4to, 1823.—*Ekl*, Bericht über die Ergebnisse in dem Chirurg. Klinikum zu Landshut, 1824.—*G. M. Sporer*, De Inflam. Morb Anim. et Veget., 1824.—*J. H. F. Wiesmann*, De Coalitu Partium a reliquo Corpore prorsus disjunctarum, &c., 4to, 1824.—*L. Emiliani*, Della Inflammazione Commentario Modena, 8vo, 1824; et Ricerche sul Trattamento delle Malattie Inflammatorie. Mod., 8vo, 1829.—*G. Konig*, Exper. circa Sanguin. Inflam. et Sanit., 1824.—*Deslandes*, in Révue Méd., tom. iii., 1824, p. 49.—*Bouillaud*, in Ibid., tom. ii., 1825, p. 256; et tom. iii., p. 73 et 367; et in Nouv. Biblioth. Méd., tom. i., p. 5 et 147.—*T. Dowler*, in Med. Chir. Transact., vol. xii., p. 86.—*J. Bostock*, in Ibid., p. 94.—*Philip*, in Ibid., p. 397.—*Berzelius*, Ueber die Theoretische Chemie, Journal de *Schweigger*, vol. xii., p. 330.—*Lallemand*, in Journ. Univ., tom. xxvii., p. 5.—*C. A Koch*, De Observ. nonnullis Microsc. Sang. Cursum et Inflam. spectantes, &c., 1825.—*K. F. Burdach*, Observ. nonnullæ Microsc. Inflam. spectantes, 1825; et Die Physiologie, 1826–1835, b. iv., Vom Blute.—*J. Black*, A Short Inquiry into the Capillary Circulation, with a View of the Nature of Inflam. Lond., 8vo, 1825.—*A. Goldoni*, Sulle Inflam. Trattato diviso in Tre Parti, part i., 1825.—*Prus*, De l'Irritation et de Phlegmone, 8vo, 1825.—*Chomel*, in Diction. de Médec., tom. xii., p. 213. Par., 1825.—*F. Paul*, Comm. Phys. Chir. de Vulner. sanand., &c., 4to, 1825.—*G. Kaltenbrunner*, Experimenta circa Stratum Sanguinis et Vasorum in Inflammatione. Monach., 4to, 1826.—*Salfender*, De Reunione Partium Corp. Hum. Element., 8vo, 1826.—*B. Travers*, Inquiry into the disturbed State of the Vital Functions, called Constitutional Irritation, 8vo, 1826; Farther Inquiry, &c., 8vo, 1835.—*J. L. C. Kolk*, *Schræder van der*, Observ. Anat. Path. et Prat. Argumenti, fasc. i., 8vo, 1826; et Sang. Coag. Histor. cum Experim., &c., 1820.—*A. N. Gendrin*, Histoire Anatomique des Inflammat., tom. ii. Par., 8vo, 1826.—*Hohnbaum*, Ueber das Fortschreiten des Krankheits-Processes insbesondere der Entzündung., &c., 1826.—*G. Wendt*, Die alte Lehre von den Entzündungen bestätigt., 2d edit. Bresl., 8vo, 1826.—*W. Gibson*, The Institutes and Practice of Surgery, &c., 2 vols. Phil., 1827.—*Bargen*, De Inflammat. ejusque Theoriis, 8vo, 1827.—*Levret*, in Journ. des Progrès des Sc. Méd., tom. v., p. 195; et tom. vii., p. 208.—*Leuret*, in Ibid., tom. viii., p. 205; et t. xii., p. 125.—*Caffin*, in Ibid., tom. xiii., p. 325.—*Buchez*, in Ibid., tom. xvi., p. 222.—*J. Brown*, Med. Essays on Fever, Inflammat., &c., 8vo, 1828.—*M. Naumann*, Zur Lehre von der Entzündung. Bonn., 12mo, 1828.—*J. L. Brachet*, De l'Emploi de l'Opium dans les Phlegmasies des Membr. Muqueuses, Sér. et Fib., &c., 8vo, 1828.—*A. Schmitt*, in Mém. de l'Acad. de Vienne, vol. ii.—*A. Pauli*, in Magaz. de *Rust*, vol. viii., p. 434.—*V. G. Wedemeyer*, Untersuchungen über des Kreislauf des Blutes, 1828.—*J. Syme*, in Edinb. Med. and Surg. Journ., vol. xxx., p. 316.—*J. Scott*, Surgical Observations on the Treatment of Chronic Inflammation. Lond., 8vo, 1828.—*Cruveilhier*, Anatom. Patholog., vol. i., p. 200.—*Andral*, Précis d'Anat. Pathol., 1829, tom. i., p. 12; et in Journ. Hebdom., tom. ii., p. 145.—*Murat*, in Nouv. Biblioth. Méd., tom. iv., p. 5; et tom. v., p. 253.—*Rust*, Magazin, &c., tom. xi., p. 460; tom. xiv., p. 487; tom. xvii., p. 161; et tom. xxvii., p. 1.—*J. F. Lobstein*, Traité d'Anat. Path., § 334, 8vo, et fol., 1829.—*Dupuytren*, in Dict. de Méd. et de Chirurg. Prat., t. i., 1829, art. ABCES.—*Caffort*, Mémoire sur la Nature de l'Inflam., 8vo, 1829.—*M. Sommé*, Etudes sur l'Inflam. Bruxelles, 8vo, 1830.—*H. Chauffard*, Traité des Inflam. Internes., 8vo, 1831.—*M. Serré*, Traité de la Réunion Immédi., &c., 8vo, 1830; et in Encyclograph. des Sc. Méd., Juillet, 1837, L., p. 97.—*Otto*, Compend. of Pathol. Anat., transl. by *J. F. South*, 1831, § 19.—*Crawfood* and *Tweedie*, in Cyc. of Pract. Med., vol. ii., p. 700. Lond., 1832.—*J. M. Good*, Study of Medicine, by *S. Cooper*, vol. ii., p. 283.—*G. Rogerson*, A Treatise on Inflam., vol. i. Lond., 8vo, 1832.—*J. L. Prevost*, in Mém. de la Soc. de Phys. de Génève, tom. vi., p. 142.—*Roche*, in Dict. de Méd. et de Chirurg. Prat., tom. x., p. 443. Par., 1833.—*D. Badham*, Reflections on the Nature of Inflammation and its alleged Consequences, 8vo, 1834.—*J. M. Gully*, in Lond. Med. and Surg. Journ., vol. vii., p. 551.—*W. Lawrence*, in Med. Gaz., vol. v., p. 97.—*J. W. Earle*, in Ibid., vol. xvi., p. 12, 70, 105.—*Burke*, in Ibid., vol. xix., p. 228.—*Bonnet*, in Ibid., vol. xxi., p. 440.—*Froriep*, in Brit. and For. Med. Rev., vol. i., p. 569.—*L. J. Sanson*, De la Réunion Immédi. des Plaies, &c., 8vo, 1834.—*M. P. Alison*, Physiology, &c., 2d edit., 1833; in 4th Rep. of Brit. Ass., p. 674; and in Edinb. Med. and Surg. Journ., vol. xlv., p. 98.—*G. Rasori*, Teoria della Flogosi, 2 vols., 8vo. Milano, 1837.—*Mueller*, in Brit. Annals of Med., 1837, p. 673.—*G. T. Morgan*, An Outline of Inflammation and its Effects. Edinb., 8vo, 1837.—*R. Bright* and *T. Addison*, Elements of the Practice of Medicine, part ii., p. 129. Lond., 1837.—*R. Carswell* and *T. Hodgkin*, in Med. Chir. Rev., vol. xxix., p. 440.—*R. Carswell*, Illustrations of the Elementary Forms of Disease, fasc. viii., and xii. Lond., fol., 1838.—*J. Macartney*, A Treatise on Inflammation. Lond., 4to, 1838.—(See, also, the BIBLIOGRAPHY and REFERENCES to the articles ABSCESS and GANGRENE.)

[AD. BIBLIOG. AND REFER.—*Beny. Travers*, The Physiology of Inflammation, and the Healing Process. London, 1843, 8vo.—*Wharton Jones*, Report on the present State of Knowledge of the Nature of Inflammation, in *Forbes's* Brit. and For. Med. Review, vol. xvii., p. 567, 1844.—*J. H. Bennett*, On Inflammation as a Process of Abnormal Nutrition. Edinburgh, 1844, 8vo.—*Fried. Gerber*, Handbuch der Allgemeinen Anatomie des Menschen und der Haussaugethiere. Bern, Thur, und Leipzeig, 1840, 8vo; translated as "Elements of the General and Minute Anatomy of Man and the Mammalia;" to which are added Notes and an Appendix, by *George Gulliver*. London, 1842, 8vo.—*J. Vogel*, Entzündung und ihre Ausgänge, in Handworterbuch fur Physiologie mit Ruchsicht auf Physiologische Pathologie, von *R. Wagner*. Braunschweig, 1842, p. 311.—*J. Lasfranc*, Clinique Chirurgicale de l'Hôpital de la Pitié. Paris, 1841, 8vo.—*John Jones*, Surgical Works of, edited by *Measc*. Phil., 1795, 8vo.—*J. M. Chelius*, A System of Surgery, translated from the German by *J. F. South*, Am. ed., by *Geo. W. Norris*. Phil., 1845, 4 Nos.—*Nathan Smith*, Surgical Memoirs, edited by *N. R. Smith*. Baltimore, 1831, 8vo.—*Jos. Parish*, Practical Observations on Hernia and Diseases of the Urinary Organs. Phil., 1836, 8vo.—*N. R. Smith*, Surgical Anatomy of the Arteries, 2d ed. Baltimore, 1835, 4to.—*Wm. Anderson*, System of Surgical Anatomy. New-York, 1822, 4to.—*Wm. Ferguson*, A System of Practical Surgery. London, 1842.—*Joseph Pancoast*, A Treatise on Operative Surgery, &c. Phil., 1844.—*Robert Liston*, Lectures in Lond. Lancet, 1844–5; and Elements of Surgery, Am. ed., by *S. D. Gross*, M.D. Phil., 1842.—*J. Syng Dorsey*, Elements of Surgery. Phil., 1813, 8vo, 2 vols., 2d ed., 1818.—*Wm. Gibson*, The Institutes and Practice of Surgery. Phil., 1824–5, 2 vols., 8vo, 7th edit.—*Samuel Cooper*, Dictionary of Practical Surgery, 8th ed. Lond., 8vo. Reprinted in New-York in 1843, edited, with a Supplementary Index, by *D. M. Reese*, M.D.—*A. Velpeau*, Nouveaux Elemens, &c., translated by *P. S. Townsend* and *V. Mott*, vol. i. and ii. New-York, 1845–6.—*C. Rokitansky*, A Treatise on Pathological Anatomy, part i., translated by *J. C. Peters*, 8vo. New-York, 1844.—*J. C. Warren*, Surgical Observations on Tumours, &c., 8vo. Boston, 1837.—*C. J. B. Williams*, Principles of Medicine, comprising General Pathology and Therapeutics, &c., with Notes, by *M. Clymer*, M.D., 1 vol., 8vo. Phil., 1844.—*E. Whitlaw*, A Treatise on the Causes and Effects of Inflammation, &c., 8vo. Lond., 1831.—*T. Watson*, Lectures on the Principles and Practice of Physic. Lond., 2 vols., 1843. Am. ed., Phil., 1845, 1 vol., 8vo.—*John Watson*, Various Papers in Am. Jour. Med. Sciences, and New-York Jour. Med. and Collat. Sci.—*Tweedie's* System of Practical Medicine, with Notes, by *W. W. Gerhard*, M.D., 2d Am. ed., in 3 vols., 8vo. Phil., 1842.—*Todd*, Practical Remarks on Gout, Rheumatism, Fever, &c., 1 vol. Lond., 1843.—*J. Thacher*, Am. Modern Practice, &c., 1 vol., 8vo. Boston, 1826.—*J. Syme*, Principles of Surgery, 2d ed., 1 vol., 8vo. Lond., 1842.—*W. Stokes* and *John Bell*, Lectures on the Theory and Practice of Physic, 3d ed., 2 vols., 8vo. Phil., 1845.—*J. Stewart*, A Practical Treatise on the Diseases of Children, 3d ed. New-York, 8vo, 1845.—*J. Palmer*, Lectures on the Principles of Surgery, with Notes, by *J. F. Palmer*, 1 vol., 8vo. Lond.—*Martyn Paine*, Medical and Physiological Commentaries, 2 large vols., 8vo. New-York, 1840.—*J. Mackintosh*, Principles of Pathology and Practice of Medicine, 4th Am. ed., with Notes, by *S. G. Morton*, M.D., 1 vol., 8vo. Phil., 1844.—*J. Lizars*, System of Practical Surgery. Edin., 1838.—*D. Hosack*, Lectures on the Theory and Practice of Physic, edited by *H. W. Duchachet*, 8vo. Phil., 1838.—*J. Hope*, Principles and Illustrations of Morbid Anatomy, 1st Am. ed., with coloured engravings, 1 vol., royal 8vo. Cincinnati, 1845, edited by *M. Lawson*.—*Samuel D. Gross*, Elements of Pathological Anatomy, Illustrated by coloured Engravings, and 250 woodcuts, 2d ed., revised and enlarged, large 8vo. Phil., 1845.—*T. Hodgkin*, Lectures on the Morbid Anatomy of the Serous and Mucous Membranes, 2 vols., 8vo. London, 1840.—*G. Gregory*, Elements of the Theory and Practice of Medicine, Am. ed.—*R. J. Graves* and *W. W. Gerhard*, Clinical Lectures, 2d ed. Phil., 1 vol., 8vo, 1842.—A System of Clinical Medicine, 1 vol., 8vo. Dublin, 1843.—*M. Gibert*, Changes of the Blood in Disease, translated by *J. H. Dix*, 1 vol., 8vo. Phil., 1843.—*G. Freckleton*, Outlines of General Pathology, 1 vol., 8vo. Phil., 1839.—*J. Fletcher*, Elements of General Pathology, ed. by Drs. *Drysdale* and *Russel*, 8vo. Lond., 1842.—*R. Dunglison*, The Practice of Medicine, or a Treatise of Special Pathology and Therapeutics, 2d ed., 2 large vols., 8vo. Phil., 1844.—*J. Eberle*, Treatise on the Practice of Medicine, 5th ed., 2 vols., 8vo. Phil., 1841.—*R. Dewitt*, The Surgeon's Vade Mecum, with Notes, by *J. B. Flint*, 8vo. Phil., 1842.—*J. Cruveilhier*, Anatomie Pathologique du Corps Humain, &c., with 125 Plates (coloured). Paris, 1842.—*D. Craigie*, Elements of the Practice of Physic, &c., 2 large vols., 8vo ed., 1840.—*J. Miller*, Principles of Surgery, Am. ed., 8vo. Phil., 1845.—*W. Braithwaite*, The Retrospect of Practical Medicine and Surgery, Am.

ed., Nos. 1 to 12, 1845-6.—*W. H. Ranking*, The Half-yearly Abstract of the Medical Sciences. New-York, vol. i., 1845-6. — *G. Andral*, Pathological Hematology, translated by Drs. *Meigs* and *Stillé*. Phil., 1844.—*Andral* and *Gavaret*, Recherches sur les Modifications de Proportion de quelques Principes du Sang dans les Maladies, 8vo. Paris, 1843.—*W. P. Alison*, Outlines of Pathology and Practice of Medicine, 8vo, Am. ed. Phil., 1845.—*William Addison*, The actual Process of Nutrition in the Living Structure demonstrated by the Microscope, &c. (2d Series of Experimental Researches). London, 1844, p. 76, 2 plates.—Philosophical Transactions of the Royal Society of London.—Medico-Chirurgical Transactions. London.—London Medical Repository.—Transactions of the Medico-Chirurgical Society of Edinburgh.—Edinburgh Medical and Surgical Journal.—London Medical Review and Magazine.—*Forbes's* British and Foreign Medical Review.—*Duncan's* Annals of Medicine. — Transactions of the Associated Apothecaries and Surgeons of England. London.—Transactions of the Association of Fellows of the College of Physicians. Dublin.—Lancet.—London Medical Gazette.—Medical Times. —*S. F. Simmons*, M.D., London Medical Journal, 8 vols. London, 8vo.—North of England Medical and Surgical Journal.—London Medical and Physical Journal.—Transactions of a Society for the Improvement of Medical and Surgical Knowledge, 3 vols. London, 8vo.—Medical and Chirurgical Review, 16 vols. London.—*James Johnson*, M.D., Medico-Chirurgical Review and Journal of Medical Science. London, 8vo.—Provincial Medical and Surgical Journal.—S. Thomas's Hospital Reports.—Guy's Hospital Reports.—Dublin Hospital Reports.—New-England Journal of Medicine and Surgery, and the Collateral Branches of Science. Boston, 16 vols., 1812-1827.—Boston Medical and Surgical Journal, 1828.—Medical Repository. New-York, 21 vols., 1797-1821. — New-York Medical and Physical Journal, 7 vols., 1822-1829.—Medical and Surgical Register. New-York, 1818.—New-York Journal of Medicine and the Collateral Sciences, 1843. — New-York Medico-Chirurgical Bulletin, 2 vols., 1831-1832.—New-York Journal of Medicine and Surgery, 4 vols., 1839-1841.—New-York Medical Gazette.—American Medical Recorder. Philadelphia, 15 vols., 1818-1829.—Philadelphia Journal of the Medical and Physical Sciences, 14 vols., 1820-1827. — North American Medical and Surgical Journal. Philadelphia, 8vo, 12 vols., 1826-1831. — American Journal of the Medical Sciences. Philadelphia, 8vo, 26 vols., 1827-1840; Ibid., new Series, commenced in 1841.—Philadelphia Medical Museum, 7 vols., 1805-1811.—American Medical Intelligencer. Philadelphia, 5 vols., 1837-1842. —Bulletin of Medical Science. Philadelphia, 1837.—Medical Examiner. Philadelphia, 1838.—Maryland Medical Recorder. Baltimore, 3 vols., 1829-1832. —Baltimore Medical and Surgical Journal and Review, 3 vols., 1833-1835. — American Journal of Dental Science. Baltimore.—Southern Medical and Surgical Journal. Augusta, Ga., 1836. — New Orleans Medical Journal, 1844.—Journal of Medicine and the Associated Sciences. Lexington, 9 vols., 1828-1837.—Western Journal of Medicine and Surgery. Louisville. — Western Lancet. Cincinnati and Lexington, 1842.—St. Louis Medical and Surgical Journal, 1842.—Missouri Medical and Surgical Journal. St. Louis, 1845. — Illinois Medical and Surgical Journal. Chicago, 1844.—British and American Journal of Medical and Physical Science. Montreal, 1845.—Buffalo Medical and Surgical Journal, 1845.]

INFLUENZA.—Syn. Epidemic Catarrh. *Influenza* (Influence), *Rheuma Epidemicum*, Sauvages. *Catarrhus Epidemicus*, Swediaur, Good. *Febris Catarrhalis Epidemica*, Huxham. *Synochus Catarrhalis*, *Morbus Catarrhalis*, Ehrmann. *Catarrhus a Contagio*, Cullen. *Febris Remittens Catarrhalis*, Macbride. *Defluxio Catarrhalis*, Young. *Catarrhe Pulmonaire*, Pinel. *Fièvre Catarrhale Epidémique*, *Grippe*, Fr. *Die Russische Krankheit*, *R. Katarrh*, *Influenz*, *Blitzkatarrh*, *Epidemischer Schnupfenfieber*, Germ. *Snufsjuka*, Swed. *Catarrho Russo*, Ital.

Classif.—1. *Class*, Febrile Diseases; 5. *Order*, Fluxes (*Cullen*). 3. *Class*, Sanguineous Function; 2. *Order*, Inflammations (*Good*). III. Class, II. Order (*Author*, see *Preface*).

1. Defin. *Lassitude; pains in the head, loins, or limbs; chills, horripilations and coryza, followed by cough, by defluxions from the respiratory passages, by fever of a nervous or adynamic character, and by anxiety at the præcordia, or pains about the margins of the ribs, the disease attacking a number of persons at the same time, and often passing into asthenic inflammation of the respiratory surfaces or organs.*

2. I. History.—*Influenza*, or *Epidemic Catarrhal Fever*, has been noticed by many medical writers since the revival of learning in Europe; and although presenting on all occasions the same general features, yet it has assumed somewhat varied characters with the several circumstances connected with its appearances. The seasons, the weather preceding or during its visitations, the climate, and the locality have, doubtless, slightly modified some of its phenomena; yet it has generally presented nearly similar features in very different seasons and situations. Indeed, whatever diversity may have existed in its several visitations has been referrible rather to the epidemic itself than to other causes.

3. The earliest recorded occurrences of influenza were in the years 1239, in 1311, 1323, 1327, 1358, 1387, and 1403. Valesco of Tarentum was a witness of that of 1387; and he remarks respecting it, that scarcely one tenth of the population escaped the disease, the aged chiefly dying of it, and rheumatic affections often following it. The most successful means of cure consisted of pectoral decoctions and sudorifics. It appeared again in 1411, 1414, 1427, and 1438. Carli, the historian of Verona, describes this last to have been general throughout Italy, and fatal to the aged and to young children. Mezerey, the French historian, notices the prevalence of influenza in France in 1482. Torrella, in his history of Italy, states that an epidemic catarrh prevailed throughout Italy and Spain in 1505, "qui paucis pepercit, senibus maxime, cum raucedine, gravedine, molestâ tussi, destillationibusque per superiora, comitante febri." The historian De Thou mentions the appearance of a similar epidemic in 1510, and Sennert remarks respecting it, "in omnes ferè mundi regiones debacchata, cum febre, summâ capitis gravitate, cordis pulmonumque angustiâ atque tussi; quanquam multò plures attigit quàm jugulavit." (*De Abd. Caus. Rer.*, lib. ii., cap. 12.) A similar epidemic pervaded Europe in 1557, and is described by Riverius, Schenck, and others. It presented the same symptoms as those observed in the recent visitations of the disease. Mercatus (*De Int. Morb. Cur.*, lib. i., c. 43) observes that the Spanish physicians were greatly perplexed as to the treatment of this epidemic, for blood-letting and purging were of no service, but even injurious in many cases; and Valleriola (*Soc. Med. Comm. Append.*, cap. ii.) states that it possessed the same characters in France, bleeding and purging being injurious, but demulcents and expectorants beneficial. The epidemic of 1578, described by Ballonius or Baillou, and which has been noticed by Ozanam and others as influenza, was evidently hooping-cough, inasmuch as it attacked children chiefly, and as the paroxysms of cough, which occurred at considerable intervals, were attended by vomiting of large quantities of a glairy fluid. That, however, which occurred two years later (in 1580) was certainly influenza. Mercatus describes not only the catarrhal symptoms, but also the pains in the head, back, limbs, and about the false ribs, usually attending this disease. He ob-

serves that blood-letting was often fatal, "Quo profectò, factum fuit, ut plures interficerent imprudentes et imperiti medici quàm mali sævitia et inclementia." Sennert (*Opera*, lib. iv., c. 17) remarks of this epidemic, that, although generally prevalent in Europe, but few died of it, excepting those who were the subjects of old pectoral or visceral diseases, or who were improperly blooded. Similar observations are offered by Wier, Zacutus Lusitanus, Campana, Riverius, &c., who state that this epidemic prevailed over the whole globe, and in Europe chiefly in April and May. Forestus prescribed a small blood-letting at the commencement of the disease, but confined this practice to the young, strong, and plethoric.

4. The epidemics of 1596, 1597, and 1617 offer nothing worthy of remark: that of 1627 was altogether the same as the one just noticed. The influenza of 1658 is fully described by Willis, as he observed it in London, in April, May, and June. Many aged, infirm, and delicate persons were cut off by it; pulmonary congestions, bronchitis, and pneumonia having manifestly, from his description, been complicated with it. He treated it by moderate blood-letting in the young and robust, and by diaphoretics and pectoral medicines. The slighter cases recovered spontaneously after a copious perspiration. This disease appeared again in Continental Europe in 1663. Bartholin, Sylvius de la Boe, and Ettmuller describe the epidemic of the summer of 1669 to have appeared after a severe spring, and variable weather at the beginning of summer. They employed chiefly sudorifics and pectoral medicines in its cure.

5. The epidemic catarrh of the autumn of 1675 was general throughout Europe. Rayger and Peu state that it appeared after a very rainy summer, and that it was preceded by thick mists and fogs, and inconstant weather. Puerperal females in many cases aborted, and others suffered menorrhagia. When the loss of blood was considerable, dropsy, debility, and prolonged convalescence ensued. This epidemic did not prevail in England until the following year. It is described by Sydenham and Ettmuller. The disease commenced with pains in the head, loins, and limbs, with great prostration of strength, cough, pains in the sides and points of the ribs, and occasionally bloody expectoration. Sydenham remarks that the pulmonary affections were merely symptoms of the epidemic aggravated by the cough, and sometimes by a too stimulating treatment and regimen. He viewed the disease as resulting from the action of a cold humid air upon the skin, the fluid secreted by this emunctory being thrown in upon the system, and exciting fever, cough, and disease of the lungs. He directed his treatment chiefly to the fever, and prescribed moderate blood-letting, diaphoretics, laxatives, diluents, and emollients. Large depletions were injurious, and evacuations prolonged the complaint in hypochondriacs and in hysterical females, and rendered the convalescence tedious. Of the less extensive epidemics of 1691, 1695, and 1699, it is unnecessary to take any notice; and those which appeared early in the eighteenth century need only to be slightly mentioned.

6. The influenza of 1729 and 1730 appeared after severe and changeable weather at the beginning of 1729, and traversed the whole of Europe during summer, autumn, and the commencement of winter. It varied in its general characters and complications in different countries and at different seasons. It was frequently not ushered in by chills or rigours, but by lassitude, depression, headache, pains in the loins and limbs, oppression at the chest, anxiety or pain in the epigastrium, coryza, severe cough, sore throat, and heat of skin, the pulse being quick and irregular. Swellings of the parotids or of the tonsils were not infrequent, and the pulse was often remarkably small and weak. In other cases, horripilations, vertigo, and rigours ushered in the disease, which sometimes assumed a severe character, delirium frequently supervening. The most violent cases occurred in low, humid, close, or miasmatous localities, and were complicated with pneumonia, pleuro-pneumonia, or with bronchitis; and the fever, in these situations especially, presented somewhat of an adynamic or malignant character. When the complaint was simple it often terminated from the fourth to the seventh day by epistaxis, or by a slight expectoration of blood, or by the hæmorrhoidal or menstrual flux. In the more complicated cases, congestions of the brain or lungs, and dropsy of the chest, frequently occurred, chronic bronchitis, consumptions, and various other diseases appearing as their sequelæ. It was most dangerous to the aged, and to those who had previous disorder of the respiratory organs. The treatment consisted chiefly of a moderate blood-letting at the commencement of the disease, in the young, strong, and plethoric; in pregnant females, and in the complications with congestion of the brain, or with inflammation of the lungs or pleura; of diaphoretics, diluents, and diuretics; and of mild purgatives, followed by anodynes, demulcents, and emollients. (Hoffmann, Beccaria, Morgagni, &c.)

7. The catarrhal epidemic of 1733 appeared in some countries as early as the preceding December, and in some places assumed a more inflammatory character than in others. The head was frequently affected, and hæmorrhages from the respiratory surfaces sometimes occurred. Children and young persons were more frequently attacked than in the influenza of 1729; but the aged, and those already the subjects of visceral disorder, were most severely and dangerously seized. The plethoric and sanguine often presented inflammations of the throat and lungs, and the bilious experienced severe pains in different parts. The intemperate suffered greatly from gastric disorder. Dropsy of the chest often supervened at an advanced stage, or as a sequela of the disease. Blood-letting was injurious, unless in the complications with pneumonia, or pleuro-pneumonia; and even in these it often proved hurtful when carried too far or exclusively trusted to. Emetics, mild purgatives, diaphoretics, and demulcents, with diuretics, and afterward tonics and antispasmodics, were found most generally useful. The same epidemic, as it occurred in the South of England, was described by Huxham, who notices the disposition to perspiration, which appeared about the second or third day, and abated the fever, proving a crisis to it about the fourth in the milder ca-

ses. He found emetics of great benefit when there was nausea or biliary disorder. After bleeding, in the pulmonary complications, he prescribed expectorants. His treatment, in other respects, was similar to that already mentioned.

8. Huxham has described the influenza of 1737 to have commenced with chills, headache, coryza, repeated sneezing, and pains in the face, loins, or limbs. Copious defluxions from the nostrils and respiratory passages, severe cough, difficult expectoration, oppression at the præcordia, &c., generally followed. Sore throats, swellings of the parotids or submaxillary glands, severe pains in various parts, and sciatica were often also complained of, the symptoms varying much with individual constitution, &c. Many experienced only slight febrile disturbance, which terminated in a moderate sweat; and in others the disease passed into a dangerous peripneumony; and the severer cases were generally followed by great prostration of strength, by consumption, pains in the limbs, or obstinate rheumatism. The treatment was nearly the same as that employed by him in the preceding epidemic; but he found that blood-letting could be carried somewhat farther than in it, particularly in the complicated cases. Blisters, diaphoretics, and expectorants were generally prescribed. For the removal of the rheumatism which followed this disease, he employed calomel, with purgatives and antimonials.

The catarrhal fever of 1742 followed a most severe winter, northeast winds having prevailed for nearly five months. Its characters were in no respects different from most of the epidemics already noticed. The most severe cases presented signs of adynamia, or even of malignancy, particularly in the aged, debilitated, cachectic, or previously diseased. In the simple form of the distemper, blood-letting and evacuations were injurious; and diaphoretics, expectorants, and diuretics were beneficial, in this and in other forms. But when the respiratory organs became inflamed, vascular depletion, cautiously employed, was requisite, particularly early in the disease. In this epidemic, paregorics, oxymel of squills, and a gentle emetic at the commencement of the complaint, or immediately after the bleeding, when this was required, were generally employed by Huxham, Sauvages, and others.

The epidemic of 1762 pervaded nearly the whole of Europe between the months of February and July. Descriptions of it have been left by De Maertens, Baker, Gilchrist, Watson, and others. It proved very fatal to the aged, the asthmatic, and previously diseased; and pregnant females often suffered abortion or premature labour when attacked by it. Gilchrist, with much justice, viewed this, as well as other epidemics of the same kind, as a fever, *sui generis*, attended by catarrhal symptoms. The course, complications, consequences, and treatment of this influenza differed in nothing from those which preceded and followed it.

11. The catarrhal epidemic of 1775 pervaded Europe, and, like several visitations of the same kind, was not confined to the human species, but affected also the lower animals, often commencing with them. It broke out during a dry and warm summer, following a mild and very dry spring. This was the first epidemic that received the name of *influenza*, it having been generally imputed in Italy to a peculiar aerial influence. It commenced with reiterated chills, lassitude, coryza, sneezings, headache, and wandering pains in the chest, loins, and limbs, followed by fever with incessant cough, copious defluxion, sore throat, hot skin, a quick, soft pulse, pale, turbid urine, and vertigo or slight delirium. About the third or fourth day, copious perspiration, hypostatic urine, and free bilious evacuations often took place, and proved critical. It required the same treatment as other preceding epidemics; and, when neglected, often passed into asthma, chronic bronchitis, and consumption.

12. Of the epidemic catarrhs which have occurred from 1775 to 1833—namely, in 1782, 1789, and 1803—I shall notice only that of 1782. It appeared in Great Britain between the end of April and the middle of June, and attacked about four fifths of the population. It was least prevalent and mildest in children. It was most severe in the aged, the asthmatic, and the previously debilitated or diseased, and, except these, but few died of it. Like other epidemics of this kind, it seldom continued longer than six weeks in a place. The treatment was similar to that adopted on former occasions. Bleeding was required only when symptoms of pleuritis or pneumonia appeared. Gentle emetics and mild purgatives were useful early in the disease—the former chiefly when the expectoration was difficult. When the expectoration was too profuse, bark or other tonics were required. Where the cough continued long and obstinate, opiates and change of air were most serviceable.*

* [Our countryman, Noah Webster, has collected most of the instances of epidemic influenza which have been recorded, and which, with a vast amount of other interesting matter, may be found in his learned work, entitled, "A Brief History of Epidemic and Pestilential Diseases," &c., 2 vols., 8vo. London, 1800. The following, according to Mr. W., are the years during which this disease has prevailed as an epidemic: 1174, 1510, 1551, 1557, 1580, 1587, 1591, 1597, 1602, 1610, 1647, 1650, 1655, 1658, 1675, 1679–80, 1688, 1693, 1697–8, 1699, 1708–9, 1712, 1717, 1729, 1733, 1737, 1743, 1744, 1755, 1757, 1758, 1761, 1762, 1767, 1771, 1772, 1775, 1781, 1782, 1788, 1789, 1790, 1795, 1797. To these may be added 1803, 1807, 1812, 1830, 1833, 1836–7, 1843, and various other years. Of these forty-four instances of influenza, it is worthy of note, that most of them happened after or during severe cold, or during moist weather, and in spring, winter, or autumn. Some, however, happened in dry, hot seasons, and others in mild winters. Mr. Webster notices, as worthy of remark, that eighteen instances occurred in years when there was a volcanic eruption in Italy or Iceland; and eleven others, though in different years, were within a few months of eruptions, making twenty-nine out of the forty-four; that almost all happened in years of great earthquakes, or within a few months preceding or following them; and, lastly, that twenty-nine instances occurred within a year, or a few months preceding or following the approach of comets. Mr. W. did not, however, consider earthquakes and volcanic eruptions as the causes of influenza, but only as *effects* of a common cause, and evidences of its existence. It would appear, from all we can gather, that some of these epidemics have been limited to the American hemisphere, at the distance of three, four, or five years from an epidemic of the same kind in Europe. In other instances, it would seem that the epidemic has spread over the whole globe, and, according to Webster, usually beginning in America; thus, in 1698, 1757, 1761, and 1781, it spread over the American hemisphere one year prior to its invading the other hemisphere; and that which encircled the globe in 1733 commenced in America two months before it did in Europe. The epidemic of 1782 invaded Europe from the side of Asia, the year after it appeared in America. The influenza of 1788, in Europe, is said to have preceded the same disease in America, the only instance, Mr. W. thinks, on record. The courses of this epidemic appear to be various. That in 1510 proceeded from Africa to Sicily, Italy, and the north of Europe. That of 1580 began in the south

13. From the foregoing brief epitome of some of the most remarkable epidemic catarrhal fevers upon record, it will be observed that they have been all essentially the same in character, and that they required the same principles of treatment. Certain differences, however, existed, not only in those of which I have made mention, but also in most of those to which I have thought it unnecessary to refer. In some, an inflammatory diathesis seemed more apparent than in others; but when inflammatory complications occurred, they always presented more or less of the asthenic diathesis; or the accompanying, and indeed the primary, fever presented more of a nervous and adynamic than of an inflammatory form. The constitutional disturbance generally preceded the inflammatory complications; such complications arising out of predisposition, of previous disorder, or of accessory causes. In some epidemics, children and young persons were more affected than in others; but in all, the aged, the asthmatic, the debilitated, and those subject to disorders of the respiratory organs were most seriously attacked. Although the disease was most prevalent between the ages of fifteen and fifty, as in most other epidemic fevers, yet it was least dangerous or fatal at this period. Some of the epidemics differed from others in the presence or severity of the pains in the head, chest, back, or limbs. In some, particularly, the pains assumed the form of a rheumatic complication, which continued after the febrile and catarrhal symptoms had been removed; in others, they seemed to depend upon biliary colluvies, or collections of morbid bile in the biliary apparatus. In some, also, the complication was very generally bronchitis, or pneumonia, or pleuro-pneumonia; while in many, sore throat, with or without swelling of the adjoining glands, or gastric disorder, was more or less evident. Lastly, some epidemics, although almost universal, were comparatively mild, and others were both severe and fatal; the fatality proceeding chiefly from the severity, or extent of the complications, and from previous disease.

14. The *sequelæ* of the several epidemic catarrhal fevers of which any satisfactory accounts have been left to us were nearly the same as observed in recent times. These consisted chiefly of chronic bronchitis; of pulmonary consumption; of hæmoptysis; of serous effusion in the thoracic cavities, consequent upon congestions of the lungs, or of asthenic inflammation of the serous surfaces in this cavity; of rheumatic and neuralgic affections in various parts; and of functional disorder of the digestive and assimilating organs. In some of the epidemics, and in that of 1837, sciatica was a not infrequent remote sequela of the disease. The *treatment* which was found most appropriate in former epidemics will be farther referred to hereafter.

15. II. Symptoms of Influenza.—The account which I shall give of influenza is derived from an extensive observation of its pathology and treatment during the epidemics of 1833 and 1837—the two most severe visitations of the disease in this country upon record, and especially in London. In both these the distemper was either *simple* or *complicated*.—*A. The simple form* of influenza was most frequent in the young and middle-aged, and the previously healthy; and usually commenced with chilliness, rigours, or horripilations, lassitude, general depression or anxiety, gravedo, and headache, followed in some hours by heat of skin, coryza, sneezing, fulness and tenderness of the eyes, soreness of the throat, hoarseness, cough, pain of the back and limbs, loss of sleep, and considerable fever. The cough was generally attended by more or less soreness of the chest, hurried respiration, slight dyspnœa, either pain or a tenderness and bruised sensation at the diaphragmatic margins of the ribs and epigastrium, and wandering pains in the trunk, especially about the sides. Nausea, loss of appetite, sometimes vomiting, costiveness, seldom diarrhœa, and a white, slightly coated, or mucous appearance of the tongue, were also present. These symptoms continued for 24, 36, or 48 hours; the cough being dry, and aggravating the sense of soreness, and the pains about the chest. Afterward expectoration became more abundant and easy; the skin softer and moister; and the pain of the head, or about the frontal sinuses, and in the chest, back, or limbs, less severe. The pulse was generally quick, sometimes a little sharp, usually soft and weak; but it was often irregular, or very changeable and uncertain. As the symptoms became mitigated about the third, fourth, or fifth day, the perspiration became more abundant, and the urine deposited a copious sediment; yet the cough frequently continued severe and obstinate, and the consequent debility was much greater and more prolonged than the severity or duration of the disease seemed to warrant. In the more severe cases, these symptoms were generally very prominent, and the febrile phenomena fully developed, transient delirium even occurring; but, in the slighter cases, several of them were not very remarkable. In this form of the disease, the chest sounded clear upon percussion, and respiration was clear and vesicular, no morbid râle being heard on auscultation; but, as the complaint proceeded, a slight mucous râle was sometimes present.

16. *B.* The Complications, or prominent affections of influenza, were chiefly (*a*) a peculiar inflammatory condition of the throat and pharynx; (*b*) severe gastric disorder; (*c*) bronchitis; (*d*) a specific pneumonia, or pleuro pneumonia; (*e*) tubercular phthisis; (*f*) a form of pleuritis; (*g*) rheumatism; (*h*) disease of the heart and pericardium; and (*i*) severe adynamic or nervous fever. The frequency of the occurrence of these affections in a predominant form was nearly in the order in which I have enumerated them.—*a. The inflammatory state of the*

of Europe in the heat of summer, and proceeded to the north. That of 1729–30 proceeded from Poland and Silesia to the west and south of Europe. That of 1733, which became universal, began in this country in the autumn of 1732, and appeared in Europe in December. That of 1788 appeared at different places in April, May, June, and August. The influenza which ravaged the United States in 1789 began in the Middle States, and spread southward and eastward. The epidemic of 1782 in Europe came from Asia, and is supposed by some to have travelled from America across the Pacific to China and Kamtschatka, as it was epidemic in this country in 1781. In the month of July, 1843, an epidemic influenza prevailed over all the New-England States, extending as far south as Virginia, and west beyond the region of the Great Lakes. Along these parallels, its invasion seemed to have been simultaneous, and the late Dr. Forry has noticed the fact, that the disease raged severely at Milwaukie, on the western side of Lake Michigan, as early as in the city of New-York. (*New-York Jour. of Med.*, vol. i., p. 65.)]

throat and pharynx was very frequent, but sometimes slight. It was always of what has been usually termed an erythematic or erysipelatous kind, but more correctly asthenic or spreading; and attended, as it proceeded, by more or less of a fluid discharge, which served to increase the quantity of matter thrown off at each fit of cough. In the severer cases, this state of inflammatory irritation was accompanied with some swelling; and in many cases, the affections of the bronchi, and of the upper portion of the digestive mucous surface, seemed only the extension of the disorder of the throat and pharynx to these parts. This affection of the throat generally subsided in two or three, or, at most, five or six days after a more or less copious discharge from the affected surface, and sometimes after the extension of disease to the gastric or bronchial surfaces—or, rather, after the disorder of the latter had become more manifest.

17. *b. Severe gastric disorder* was indicated by soreness and tenderness at the epigastrium and under the lower end of the sternum, and by nausea and vomiting, sometimes with thirst. It was often very early observed; and when it and the preceding affection were present in the same case, which was not infrequent, it was difficult to determine which had been the first to appear, or whether they were coetaneous in origin. Indeed, they seemed often to have been prominent local manifestations of the constitutional disease, arising nearly at the same time. Although rendering the disease more or less severe, increasing the debility and general depression, and prolonging convalescence, the gastric complication was never fatal, or even dangerous. It was sometimes associated with considerable derangement of the biliary functions and secretion, with slight costiveness, and in some cases with diarrhœa; the irritation in these latter having seemed to extend along the digestive mucous surface.

18. *c. Bronchitis* was one of the most frequent and severe complications observed in the last two epidemics, especially in that of 1837. But it was different from the acute sthenic bronchitis usually observed as a primary disease, or as occurring in previously healthy persons. It was attended, in many cases, with more marked vital depression, with a more copious expectoration of a grayish, viscid, ropy, and less frothy mucus, which often quickly passed into a thin, muco-puriform matter, than in idiopathic bronchitis. In most of the cases both lungs were more or less affected, and the disease seemed rapidly to extend along the larger bronchi to the smaller ramifications, until, in the dangerous or fatal cases, the air cells themselves became implicated. At the commencement of the bronchial complication the cough was hard, dry, and severe; but expectoration soon became abundant, the wheezing from the accumulation of the morbid secretion in the bronchi being often remarkably loud. The cough and the quantity of the sputa were generally increased at night, the former being frequently so severe, and the attendant dyspnœa so urgent, as to prevent the patient from lying down. When both lungs were gravely affected, the patient was obliged to sit or be shored up by pillows. In some cases the sputa were remarkably abundant, consisting of a very fluid muco-puriform matter, almost from the commencement. In most of the bronchial complications, the *dyspnœa* was considerable, and especially when expectoration was difficult and the sputa copious; still it was often great when the discharge from the respiratory passages was neither abundant nor difficult. The rapid extension of this asthenic form of bronchitis throughout the lungs was most remarkable in the delicate, the aged, the cachectic, and those subject to asthmatic or bronchial disorder. In some instances it quickly superinduced a nervous or asthenic form of pneumonia or pleuro-pneumonia, with which it farther became associated; and occasionally it seemed to have given rise to more or less emphysema of the lungs. The mucous, or the crepito-mucous rhonchus was generally heard in most of these cases. The pulse was usually upward of 100, often above 110, and irregular. The severer forms of this complication often terminated fatally, owing to the quantity of the morbid secretion filling the smaller bronchial ramifications, infiltrating the air-cells or even the areolæ of the connecting cellular tissue, and thus occasioning asphyxia.

19. *d.* The *pneumonia*, or pleuro-pneumonia, with which influenza was often associated, was generally of a nervous or an asthenic form. It was either an early complication, or was consequent upon the bronchitic affection. It was indicated by oppression, weight, and anxiety in the chest; by difficult or anxious breathing; by a crepitous, or crepito-mucous rhonchus in the vicinity of parts where neither the respiratory murmur nor any morbid sound was heard, and where more or less dulness existed on percussion. The sputa were muco-puriform, distinct, copious, and but rarely bloody or rusty. This complication was always severe, was often farther associated with bronchitis, and, in these cases, the patient could not lie on either side, but required to be propped up in bed. The changes observed in the lungs after death were different from those usually consequent upon idiopathic pneumonia (§ 32, 33).

20. *e. Tubercular phthisis* was generally aggravated by the influenza, and was not infrequently called into existence by it where the predisposition already existed, or where the tubercles were in a latent or crude state. In some instances, the subsequent stages of consumption were accelerated by it; but few cases terminated fatally during the epidemic seizure, unless at a far advanced stage of the tubercular formations, and then evidence of extensive bronchial disease was generally furnished both during the attack and upon examination after death. Yet I met with instances of persons in far advanced phthisis, who either experienced comparatively slight attacks of influenza, or had not their malady greatly aggravated, or its course materially accelerated, by the epidemic. Much of this seemed owing to the treatment pursued in these cases. The complication of influenza with phthisis was not, in my practice, more frequently attended by *hæmoptysis* than it is in other circumstances, although hæmoptysis was frequent in phthisis subsequent to, or developed by the epidemic malady.

21. *f. Pleuritis* was not a frequent complication, unless connected with pneumonia; but when it occurred, its characters were much

modified by the primary epidemic distemper. It generally appeared insidiously, the pains attending it having been often mistaken for the pains of the chest and vicinity usually attending the severe cases of the epidemic, and the latter having often masked the former. In some instances, effusion from the affected surface had proceeded far before the existence of inflammation was suspected; the matter effused, instead of having consisted more or less of fibrinous or coagulable lymph, as in the sthenic forms of phlegmasia, having generally been fluid, turbid, sero-albuminous, or sero-puriform, and abundant. Hence adhesions of the opposite surfaces were never produced by the pleuritis complicating influenza, although old adhesions were frequently found upon dissection of fatal cases. In rare instances, not only pleuritis, but also pericarditis of a similar character, coexisted with influenza.

22. *g. Rheumatic affections* were seldom observed, even in those subject to them, during the epidemic malady; but they more frequently occurred subsequently as sequelæ. The wandering, and sometimes severe, pains characterizing influenza could not be viewed in the light of a rheumatic complication. When rheumatism appeared, it was generally obstinate, and, unless very appropriately and energetically treated, aggravated and prolonged the disease, and protracted convalescence.

23. *h. The complication with disease of the heart or pericardium* was observed chiefly in persons who were previously the subjects of such disease. A form, however, of asthenic pericarditis was met with in rare instances, either alone, or in conjunction with pleuro-pneumonia or pleuritis. But, in such cases, the inflammation gave rise to a similar effusion to that observed in the associated pleuritis already noticed (§ 21).

24. *i.* In some cases influenza assumed so severe a character as nearly to approach *low nervous* or *adynamic fever*, owing to the great depression of organic nervous power, and the delirium and other cerebral symptoms attending it. Yet the disease was very different from these states of fever; and chiefly as regarded the catarrhal or bronchial symptoms, the sharpness or acuteness of the attack at the commencement, the free and general perspirations early in its course, the less loaded and more moist states of the tongue, the pale and turbid condition of the urine, the less complete loss of muscular power, and the much shorter duration of the febrile phenomena, when appropriately treated, in the former malady.

25. *k.* Some other complications were observed, particularly *laryngeal, croupy*, or *tracheal irritation*, of various grades of severity, but generally of a similar character to the bronchial affections already noticed (§ 18), with which these were usually associated. They were seldom, however, met with, as the only, or even as the most prominent complication. In slight forms, causing, at first, more or less hoarseness, and a harsh, clanging, and dry cough, and, subsequently, a convulsive or strangulating cough, with difficult expectoration and viscid sputa, these affections were very common, and were often either a part, or the commencement of the phlegmasia which extended from the throat to the bronchial ramifications, the larynx and trachea presenting, in fatal cases, similar appearances to those seen in the bronchi and pharynx.

26. These were the chief local affections which complicated the last two epidemic catarrhal fevers, and rendered them severe and often fatal. Some of them, it will be seen, were antecedent disorders, not only rendering more violent the epidemic attack, but themselves becoming, in turn, more developed and aggravated by the constitutional disease. Others, again, were evidently called into existence by the epidemic malady, owing to latent predisposition, or to various concurring or accessory causes. Very generally, however, influenza did not supervene upon acute visceral or febrile disease until the latter was subdued or the patient was convalescent. Thus, I saw several patients with bronchitis, pneumonia, &c., near the end of December, 1836, just before influenza had appeared; and, although the epidemic prevailed in the same family during the acme and subsidence of these diseases, it did not attack these persons until convalescence had either commenced, or had made considerable progress. It was generally severe in such cases, the constitutional and local affections presenting an asthenic character; but recovery took place in all.

27. *C. Exacerbations* or *relapses* of the disease were sometimes observed after premature exposures and errors of diet; but the relapses were not always more severe than the primary affection; and so rarely occurred, if once the patient was truly convalescent, that they were rather exacerbations, or prolongations of the disease, in consequence of a superinduced complication, or the production of renewed bronchial irritation. Many of the affections which were viewed as relapses were cases of bronchitis or of tracheal irritation, caused by cold during convalescence, and increased or modified by existing disorder of the digestive canal and of the biliary organs, and by debility.

28. *D. Certain of the symptoms* require a brief notice: The *tongue* was not materially affected in many; in some, it was white; in others, it was covered by a soft, or cream-like, or yellowish mucus or fur. The *fauces, pharynx*, and tonsils were generally red. There was always loss of *appetite*, and generally *nausea* or *vomiting* at the commencement; in some, bile was thrown up. *Thirst* was not complained of in the majority of cases. The *urine* was usually thick or turbid, somewhat red, and deposited a pink sediment as the attack subsided. *Cough* was always present from the first day, and was often very severe for two or three days; but it was often prolonged, sometimes after the subsidence of the attack, and assumed a convulsive form. There was often *dyspnœa*, with more or less wheezing and restlessness, but chiefly in the complicated cases, or in asthmatic persons. The *expectoration* was chiefly mucous, and as already described, unless in the bronchitic or pulmonic complications, or in those subject to chronic catarrh or bronchitis; and in these it was muco-puriform. No morbid *ronchus* or *râle* was heard in most of the simple cases, although the cough and dyspnœa were severe. The *pulse* was more or less accelerated, generally soft, weak, and occasionally small, especially as the disease advanced;

but it was often irregular, being at one time sharp, hard, or wiry, for a short period, and then becoming soft and weak. The sharpness or fulness of the pulse sometimes led to bloodletting, which was seldom of service, even when the disease was associated with inflammation, unless prescribed in great moderation, and at a very early stage. In London, however, blood-letting was rarely indicated by the symptoms, the phlegmasia often complicating the disease being decidedly asthenic, and more frequently aggravated than ameliorated by vascular depletions. The *blood* was sometimes buffed in the complicated cases; the buff being deep and gelatinous, but seldom cupped or tenacious. Much mental and physical depression *existed*, and the character of the *febrile* or *constitutional affection* was decidedly *nervous* from the commencement, vascular action being more or less asthenic or adynamic throughout. But the febrile symptoms varied much, not only at different periods, but also at the same stage, according to the constitution, previous health, and age of the patient, and to the severity and complication of the disease.

29. *E. The sequelæ of influenza* were sometimes more dangerous than the primary malady; and the severity or danger of these had frequently no relation to the violence of the epidemic seizure; for the consequent affections were often most serious in persons who had experienced a comparatively mild attack of influenza, and as frequently slight in those who were severely attacked.—*a. Tubercular consumption* was observed chiefly in those who had an hereditary tendency to the disease, and in whom tubercles had evidently existed in a latent, undeveloped, or crude state, the influenza having promoted their evolution.—*b. Chronic bronchitis* also not infrequently occurred, either the bronchial complication having degenerated into a chronic and asthenic form, or this form having appeared during convalescence from the influenza, owing to the predisposition left by it. In either case, the disease was obstinate, and required a restorative treatment and regimen, with change of air.—*c. Asthmatic affections*, often presenting a nervous, convulsive, or spasmodic character, in conjunction with bronchial congestion or irritation, and sometimes with considerable bronchial discharge, were occasionally met with in persons advanced in life. In these, the cough, dyspnœa, and wheezing were more or less distressing, and complete or even partial relief was afforded with difficulty.—*d. Disease of the heart* was sometimes a sequela of influenza; but it might have existed previously, although it did not become so fully developed as to attract attention until subsequently to the epidemic attack. Indeed, a more or less asthenic *endocarditis* or *pericarditis* may have occurred as a complication of influenza at some period of its course, this latter rendering the former still more obscure, until the more advanced consequences of the complication, and the subsidence of the primary malady, rendered the nature of the lesions more manifest. However induced, there can be no doubt that lesions of the heart of various kinds, and such as usually result from inflammatory irritation, were often met with in those who had experienced severe seizures of the epidemic. In some, the disease of the heart was associated with asthma or with more constant dyspnœa, and seemed aggravated by the debility consequent upon the influenza, especially in chronic cases, and where the heart affection was not decidedly inflammatory.—*d. Hæmorrhage* from the respiratory organs was occasionally met with in those labouring under phthisis; but it may also have arisen from congestion of the lungs, and interrupted circulation through the heart.—*e. Dropsies*, especially of the *thoracic cavities*, were sometimes observed as consequences, more or less remote, of severe attacks of influenza, particularly where the lungs had been implicated, or where disease of the heart existed previously, or where asthenic pericarditis had existed as a complication. But still dropsy was not so frequent a sequela of this as of some other epidemics.—*f. Obstinate dyspepsia*, and other *functional disorders* of the *digestive organs*, were very common sequelæ of this malady, and generally required change of air, with strict attention to diet, for their permanent removal.—*g. Rheumatism* was a not infrequent consequence of the epidemic, and, as far as my experience enabled me to judge, was most benefited by a restorative and tonic treatment, with antacids, sometimes with colchicum, and change to a dry, pure air.

30. III. Progress and Duration.—The disease generally presented an acute stage, lasting from three to five days, and, in the slighter cases, terminating either then, or in two or three days; but it more frequently, especially in the severer seizures, continued, in a less acute form, for a period varying from five to fifteen days longer. The course and duration of the complicated cases were very indefinite; and the recovery from these, as well as from all the most severe attacks, was attended with great debility, which often continued for a long time, even although none of the *sequelæ* or consequences just mentioned were manifested.

31. IV. Diagnosis.—*Influenza* may readily be confounded with *acute bronchitis*, and with common or *sporadic catarrhal fever*, but may easily be distinguished from them by attention to the following circumstances: Influenza commences with very manifest disorder of the organic nervous system, as in all other idiopathic fevers, or epidemic maladies; and, although a predominant affection of the respiratory passages soon takes place, yet the digestive organs and circulating system are also more or less deranged. The dyspnœa attending influenza is much greater, relatively to the other indications of disorder in the lungs, particularly those furnished by the aid of the stethoscope, than in the complaints just mentioned. The pains complained of in the head, loins, limbs, and about the insertion and edges of the diaphragm; the severity of the cough in the night, and the general insomnia; the physical depression, and the weakness and irregularity of the pulse; the epidemic prevalence of the disease; and the different effects of medicine in it, and in those disorders, farther serve to distinguish between them. Influenza differs also from the *catarrhal fevers* of spring and autumn, in the great debility, in the spasmodic pains and disturbance of sensation generally, in the nausea and vomiting, in the disposition to sweating, and the occasional appearance of an

exantheme, and in the peculiar expression of the face, which attend it; in its almost universal prevalence, and in the danger to the aged.

32. V. Appearances in Fatal Cases.—The changes observed after death were referrible, 1st, to pre-existent disease; and, 2d, to the effects of the epidemic and of its complications: to these latter only attention need be directed. The *trachea* and *bronchi* contained more or less of a frothy, muco-puriform, and frequently sanguinolent matter, which was most abundant in the smaller bronchi. The *mucous membrane* lining these parts was generally of a dull red, or of a livid or dark hue, from congestion of the small vessels, and softened and thickened. These appearances were sometimes confined to one lung, but they more generally extended to both. The *substance of the lungs* was often darker than natural, and of a livid or violet colour. The air cells, and frequently the tissue of the organ, seemed partially infiltrated by a muco-puriform, or muco-sanguinolent fluid, which rendered it denser, and less crepitant on pressure, than usual; and its vital cohesion was much weakened. In aged, asthmatic persons, the lungs were generally very dark-coloured, much softened, infiltrated with fluid, partially emphysematous, and otherwise changed; a dirty or turbid serum being sometimes effused into the cavities of the thorax. The *pleura* was occasionally partly or very extensively adherent; but the adhesions were always the consequences of old disease. The *blood* in the heart and large vessels was generally dark and fluid.

33. In the younger and more robust subjects, where the indications of associated pneumonia were the most manifest, the lungs were also of a dark hue, congested, infiltrated with a dark or sanguinolent fluid, much denser than natural, or splenified, no longer crepitant, but not truly hepatized, as in true or sthenic inflammation; for the matter thus filling the areolar tissue of the organ was not a coagulated or fibrinous lymph, but an uncoagulable fluid, which could be more or less completely squeezed out of the part. The substance of the lungs was also torn with greater ease than usual, and the bronchial mucous membrane and bronchi presented the appearances already described (§ 32). Both lungs were thus diseased in many cases; and, even when one lung only was affected, the inflammation was more or less diffused, as in other instances of asthenic phlegmasia. In some, the most depending portions of the lungs were most infiltrated and congested, showing that the changes had partly taken place at the time of, or subsequent to, dissolution. Appearances of asthenic inflammation were, in a few cases, observed in the *heart* and *pericardium*, with the effusion of a dirty serum into the latter; and, as Dr. Clendinning has remarked, in his excellent paper on the disease, these lesions were generally associated with those produced by pneumonia and pleuritis. Old disease of the heart was met with in many aged persons; and, in those who had been labouring under tubercular consumption, the bronchial mucous membrane, and tissue of the lungs between the tubercular formations, presented very similar changes to those described. The *digestive mucous surface*, particularly of the pharynx, œsophagus, and stomach, was congested, and sometimes presented patches or streaks of a dark red, or livid hue. I never saw the exudation of lymph or coagulable albumen in the small bronchi, resembling the false membrane of croup, which Dr. Gluge says he met with, nor is it mentioned by any other writer. My own dissections were few; but I have adduced also the results obtained by Drs. Clendinning, Macleod, Graves, and others.

34. VI. Causes.—The seasons, and the state of the weather both antecedently and at the time of the outbreak of influenza, have had no share in its production. Whether appearing in spring, summer, autumn, or winter; or occurring in mild and dry, or in cold and moist weather; or prevailing in cold, temperate, or warm countries, it has presented the same general features; and, even in seasons and climates most likely to have rendered it more than commonly mild, it has sometimes assumed a severe form; while it has presented a milder character in countries where it might have been expected to have been a more formidable disease. No dependance, therefore, can be placed upon climate, season, and weather, in modifying its severity or complications, although they doubtless have had more or less influence in this respect on some occasions.

35. This epidemic has not arisen from the prevalence of easterly, northerly, or other winds; for, not only have winds from such quarters prevailed without influenza having occurred, but it has broken out in different places during the prevalence of winds from different quarters. That it has not proceeded from cold in any form or way, is proved by the circumstance of persons who took the greatest care of themselves, as respects clothing and exposure, having been attacked as well as those who were constantly subjected to the vicissitudes of season and weather. Yet, in some instances, as Dr. Graves has remarked, exposure to cold determined the immediate access of the disease, or increased its violence when present; and, I would add, gave rise to several of its complications. No kind of occupation seemed to protect from its visitation; nor did the impregnation of the air with gaseous fluids, usually considered disinfectant, have this effect. It is probable, from the very rapid progress of the complaint over nearly the whole globe, that it depended, either, as Dr. Graves suggests, "upon telluric influence—upon some agency connected with variations in the physical conditions which operate on the external surface of our planet;" or upon a very general change in the usual conditions of the electricity circulating on the surface of the earth: but these, in the present state of our knowledge, are merely conjectures.

36. As to the influence of *infection* in causing and propagating influenza, some diversity of opinion exists; but the question admits of a tolerably easy solution. That the disease neither originated in, nor was diffused by, *contagion*, direct or mediate, seems satisfactorily proved, by the nature of the disorder, and by the phenomena and circumstances connected with its appearance and spread. No facts have been aduced of a contagious property, according to the meaning I have attached to the term (see art. Infection, § 1–3), having belonged to it; while numerous circumstances, showing

that it was devoid of such property, have been observed by all who were practically acquainted with it. The almost simultaneous outbreak of the epidemic in distant countries; the rapidity with which it traversed immense spaces; the fact of its often pursuing, in its spread, a different course from that of human intercourse; the great numbers attacked at the same time, when it appeared in a town or district; and the frequent suddenness of the seizure, showed that it proceeded chiefly from a very generally diffused change in the atmosphere, that modified or infected the system in a determinate manner. That this malady depended principally upon atmospheric influence, these and other considerations fully prove; but that, in some instances, other agents or causes concurred with, or aided this, the principal cause, may be admitted. These other concurring or aiding causes seem to have been the ordinary exciting causes of catarrh, and infection proceeding directly from those labouring under the malady. It was often observed that communication with those already attacked appeared to favour the development of the complaint in the healthy; for when an individual came with the disease from a distance, the inhabitants of the house in which he arrived were usually the first attacked. But it must be conceded that this infection was a very subordinate cause to that upon which the epidemic principally depended, and that it was merely a concurrent and contingent circumstance in the diffusion of the complaint.

[The theory that epidemic influenza is owing to atmospheric vicissitudes of temperature and humidity, and the prevalence of particular winds, is now very nearly abandoned, as the malady prevails in every climate, at all seasons, and during every variety of wind and weather. During its extensive prevalence in this city in the summer of 1843, it was very generally attributed to the combined influence of cold and variable weather, and the humidity produced by the recent introduction and constant flowing of Croton water; but this opinion had to be abandoned when it was found that the disease attacked the crews of ships in mid-ocean, where the temperature is characterized by comparatively opposite phenomena, and that it rapidly swept over the whole Continent, and traversed, also, the Eastern hemisphere. It is possible that the disease is owing to the diffusion of some noxious matter through the atmosphere, which, like malaria or the virus of contagious affections, cannot be detected by chemical analysis. Berzelius, for example, informs us that, after inhaling a minute portion of seleniuretted hydrogen, he lost the sense of smell, and suffered for many days from cough, suffused eyes, and catarrh. And Dr. Prout has suggested that these epidemics may be produced by some combination of selenium diffused through the atmosphere: a notion supposed to be favoured by the fact that this substance is often associated with sulphur in volcanic emanations. It is contended that these gaseous emanations will not be prevented from spreading over the earth by the ordinary atmospheric currents; for it is well known that even the grosser kinds of volcanic matter have been often transported many hundred miles in a direction opposite to the wind, evidently by some counter-current. This doctrine of terrestrial or mineral exhalations, which has been a favourite one in all ages, was espoused by Sennertus and Sydenham.

Others have indulged in the speculative idea that the disease is occasioned by the diffusion of animalculæ, which have been proved to exist abundantly in the atmosphere, by the observations of Ehrenberg. Although this hypothesis of insect life as a cause of disease is by no means a new speculation, yet it seems to us scarcely worthy of examination in the present state of our knowledge on this subject. Dr. Sweich maintains that *electricity*, being accumulated in the body, and prevented radiating thence, is the cause of the disease. He adds, that it can be shown that, during the prevalence of influenza, there is always an abnormal accumulation of electricity in the air, which, according to physical laws, is always an isolator of the electricity of the organism. This hypothesis should not be rejected until we possess something more satisfactory. All great changes in the atmosphere and in terrestrial bodies tend to alter very much the electric relations of the air, such as changes of weather in its temperature, moisture, volcanic phenomena, earthquakes, floods, &c. In this respect, Dr. S. says that the winds also require to be taken into account, as the north and east winds bring the positive, and the south and west the negative electricity. It is always set free by evaporation, and the northern lights appear to increase its quantity; but it remains to be shown that those causes which produce changes in the electric condition of the atmosphere only, always existed at the time of the appearance of the epidemics of influenza, and that they have existed at no other times.

Dr. S. maintains that the result of an examination to this effect is favourable to his hypothesis, and proceeds to show that, at the time when epidemics of influenza have prevailed, there have existed causes especially capable of changing the electrical conditions of the atmosphere, such as earthquakes, frequent and rapid alterations of the weather from hot to cold, and moist to dry; rains and floods; offensive and thick fogs; northern lights; volcanic eruptions; whirlwinds, and other conditions indicated by remarkable barometrical changes, &c.; but, however coincident some of these may have been with certain epidemics, the conclusions which can be derived from them in support of the electric hypothesis appear to rest on a very feeble foundation. (See *Brit. and For. Med. Review*, Jan., 1839.) The experiments of Volta, moreover, failed to detect any electrical changes in the atmosphere of affected places. Dr. Tweedie observes, that "the uniformity of the course of influenza from east to west, thence turning round to the south, may be conceived to intimate some connexion with magnetic currents, and it is not improbable that magnetical conditions may have some effect in predisposing the system to the morbid influence, or in modifying the causes on which the malady may essentially depend."—(*System of Pract. Med.*)]

37. The disease was not very materially influenced in its spread by *age*. It was, however, most prevalent in persons of from 16 to 60; and, upon the whole, the least prevalent and most mild in children, although severe and

complicated seizures were not uncommon even in them. It was very frequent, most complicated and severe, in the aged—from 60 upward. *Sex* and *temperament* did not appear to have influenced the liability to an attack. It did not appear that a former seizure caused exemption from it afterward. The author attended several persons in the epidemic of January, 1837, who had been attacked, as well as others who had not been attacked, by that of 1833; but he also saw some who had the influenza of 1833, and who escaped that of 1837. He is acquainted with very few instances of entire exemption from both these epidemics. He and his family escaped on both occasions. Generally, when one in a family was seized, the majority of its members were soon afterward affected; but often two or three were attacked so nearly at the same time that it was difficult to assign the priority to any one. The epidemic continued about six or seven weeks in a place; but a few cases occurred just before, and others not until a short time after its general prevalence. A circumstance of some importance, although very frequently overlooked, in respect not only of the two latest, but also of former epidemics of this kind, has been observed, and recorded by several writers, namely, the appearance of the complaint, also as an epidemic, among many of the lower animals, particularly horses and dogs, for some weeks or months before the outbreak of it in the human species.

38. VII. NATURE.—It was evident, from an attentive consideration of its phenomena, that influenza partook largely of the characters of an epidemic fever. It was also manifest that the exciting cause of the complaint, whatever may have been the nature of that cause, existed in the air; and that, by this medium, it morbidly impressed the organic nervous influence, especially in the respiratory organs, where its first invasion took place in the process of respiration, these organs thus becoming and continuing prominently disordered. This primary and especial affection of the organic nervous influence was shown by all the premonitory and early symptoms. That this affection was not only peculiar or specific, but was farther characterized by depression—that the organic nervous energy was remarkably weakened as well as otherwise changed—was evinced by the lassitude and debility which were present from the commencement of the seizure; by the affection of the digestive and circulating organs; by the spasmodic and nervous pains in the trunk and limbs; by the states of vascular action and of the blood; and by the general debility produced by the complaint. The circumstances of the pains not having been aggravated by pressure, of their wandering and diffused character, and of the spasmodic nature of the cough, were proofs that the disease was not essentially inflammatory, although inflammation of a more or less asthenic form sometimes supervened. This position was farther strengthened by the state of the circulating organs and fluids, and by the appearances observed in fatal cases. That fever, or, rather, increased temperature of the surface of the body, was not remarked in some cases, and in some even of the most dangerous complications of the disease, did not militate against the opinion of influenza being an epidemic fever *sui generis*, with early and prominent disorder of the respiratory passages and organs.

39. VIII. TREATMENT.—The *milder* and *simpler states* of influenza require little more than the early restoration of the cutaneous exhalation by diaphoretics, and the evacuation of disordered secretions by mild chologogue purgatives. In the majority of cases, five grains of blue pill and six of compound extract of colocynth, with one of ipecacuanha, given at bedtime, and a mild aperient the following morning if these did not act freely, were extremely useful; but if there were nausea or retchings, seemingly proceeding from biliary disorder, a mild *emetic*, or the warm infusion of chamomile flowers, was premised with advantage. Subsequently, diaphoretics consisting of camphor mixture, solution of the acetate of ammonia, and the spirit of nitric æther, sometimes with a little ipecacuanha or antimonial wine, were given every third or fourth hour. In many instances, nothing farther was necessary; but when the bowels required aid, a draught consisting chiefly of the compound infusions of gentian and senna, or a pill containing compound extract of colocynth, the extract of hyoscyamus and ipecacuanha, was taken at bedtime.

40. In the *more severe attacks*, and when much febrile excitement and heat or dryness of skin were present at the commencement, a full dose of calomel, with JAMES's powder, and a grain of camphor, was given at bedtime, a purgative draught being taken in the morning. The diaphoretic prescribed above (§ 39) was also taken every three hours, with a few drops of antimonial wine, until a free perspiration was produced. A warm bath was occasionally prescribed at bedtime, and generally was of great service. After a free perspiration had been procured, a few drops of the aromatic spirits of ammonia were substituted for the antimonial wine; and as the disease declined, mild restoratives or tonics, and a light diet, were found most beneficial.

41. When the *cough* was very severe, and dry, or attended by much soreness at the chest, a larger dose of calomel and JAMES's powder was prescribed, as much tartarized antimony as the stomach could bear was given in the diaphoretic mixture (§ 39), and the warm bath and warm demulcents were resorted to. As soon, however, as the cough became more loose, and the defluxion from the respiratory surfaces either free or abundant, the calomel and the antimonials were relinquished, and the less depressing diaphoretics prescribed. The application of a mustard poultice, or of the warm turpentime fomentation to the chest, or of a rubefacient plaster between the shoulders, was also serviceable. At an advanced stage of these cases, the following pills, either alone or in addition to warm diaphoretics, were found most beneficial, especially in aged or weak persons.

No. 268. ℞ Camphoræ rasæ, Massæ Pilul. Ipecacuanhæ Comp., ää ℈j.; Extr. Hyoscyami (vel Extr. Papaveris), ℈ss.; Mucilag. Acaciæ, q. s. M. Fiant Pilulæ, xviij., quarum capiat duas, quartâ, quintâ, vel sextâ quâque horâ.

No. 269. ℞ Massæ Pilulæ Scillæ Comp., Massæ Pilulæ Galbani Comp., ää ℈j.; Pulv. Ipecacuanhæ, gr. vj.; Extr. Conii (vel Extr. Papaveris), ℈ij.; Olei Anisi, q. s. M. Fiant Pilulæ, xxiv., quarum capiat duas, quartis vel sextis horis.

42. When influenza was *complicated with bronchitis*, or with *pneumonia*, a modification of the above treatment was generally requisite. Much

mischief, however, was produced—as I witnessed in several instances in consultation—by having recourse to a too antiphlogistic means, and to large depletions, in these complications. Not infrequently, also, congestion only of the bronchial mucous surface, or of the lungs, and great accumulations or inordinate secretions of mucus in the smaller bronchi, were mistaken for bronchitis and pneumonia, and treated accordingly. Even where inflammatory action was more decidedly evinced, the fact of its association with an asthenic or adynamic condition of nervous power and of vascular action was often overlooked, and a truly *nervous* or *asthenic pneumonia* or *bronchitis* was treated too generally in the same manner as the primary and uncomplicated states of these inflammations. The same remarks are nearly equally applicable to the occurrence of *pleuritis* or of *pericarditis* in the course of the malady. Even for these, blood-letting and the rest of the antiphlogistic treatment required the utmost caution. They were beneficial only when *very early* and moderately prescribed. I derived great advantage in these complications from the application and repetition of embrocations or fomentations with spirits of turpentine, or with either of the *liniments* in the APPENDIX (F. 296, 311), until considerable redness, or even vesication was produced. Calomel or blue pill, with camphor and henbane, and sometimes with digitalis, or ipecacuanha, or JAMES's powder, was generally of service; and a diaphoretic mixture of camphor julep, the solution of the acetate of ammonia, spirits of nitric æther, or a small dose of antimonial or ipecacuanha wine was very commonly prescribed. As the more inflammatory state subsided or disappeared, the aromatic spirit of ammonia was substituted for the antimonial preparation, and a restorative regimen and change of air recommended. (See arts. LUNGS—*Asthenic Inflammation of*; and PLEURA—*Asthenic Inflammation of.*)

43. If *bronchitis* degenerated into a chronic state, camphor, the decoction of senega, or preparations of squills or of ammoniacum, were employed, and the most permanent derivatives and counter-irritants resorted to. In such cases, the means described in the article BRONCHI (*Chronic Bronchitis*, § 93–103) rarely failed of removing all disorder.

44. In the complications with *affection of the throat, larynx*, or *trachea*, the warm terebinthinate fomentations or embrocations already noticed, applied around the throat and neck, never failed of imparting complete relief, the rest of the treatment already described being generally adopted. Blisters to the throat were injurious; but, when applied to the nape of the neck or over the sternum, they were often of service. Early in these complications, as well as in the association with bronchitis, an emetic of ipecacuanha was frequently beneficial. The warm bath, the semicupium, and pediluvia were also sometimes of service. When there was much tenderness of the epigastrium, and *gastric irritation*, a mustard poultice, or the warm terebinthinate fomentation, or other rubefacients applied to this region, and purgative enemata, generally afforded relief.

45. At an advanced stage of the complaint, when, in consequence of its severity or complications, the powers of life indicated much depression by the state of the pulse, the perspirations, or the abundance of the sputa, or difficulty of expectoration, camphor, quinine, ammoniacum, senega, ammonia, and other expectorants and restoratives, in liberal doses, were indispensable.

46. During convalescence, change of air, a restorative regimen, and the use of flannel nearest the skin, were commonly necessary. In other respects, the same means as have been advised for the treatment of DEBILITY (§ 35, *et seq.*), and for convalescence from FEVER (§ 167, 612), were then requisite.

BIBLIOG. AND REFER.—*O. Bruguer*, Enarratio novæ et manifestæ Destillationis, &c. Barcin., 8vo, 1562.—*J. Bockel*, Synopsis novi Morbi, quem plerumque Catarrhum Febrilem, &c. Helmst., 8vo, 1580.—*W. Falconer*, Account of the Influenza at Bath. Bath, 1731; in Mem. of the Med. Soc. of London, vol. iii., No. 3; and Account of the Epidemic Catarrhal Fever at Bristol in 1803. Bath, 8vo, 1803.—*Juch* and *Duberbuhler*, De Febre Catarrhali Epidemica (in Hall, D. ad M., v.), 1743.—*J. J. Isenflamm*, Versuch von den Ursachen der Allgemeinen Brustkrankheiten. Wien., 8vo, 1762.—*W. Watson*, Remarks on the Influenza of London in 1762 (in Ph. Trans.). Lond., 8vo, 1762.—*G. Baker*, De Catarrho et Dysenteria Londinensi, Anni 1762. Lond., 4to, 1763.—*F. Gilchrist*, in Ed. Med. Ess., vol. iii., p. 409, 1763.—*J. Williams*, Some Histories of Wounds, with Observations on the Convulsive Cough of the year 1764 in Cornwall. Falm., 8vo, 1765.—*J. F. K. Grimm*, Sendschreiben an Haller von der Epidemie zu Eisenach. Hildh., 8vo, 1768.—*W. Heberden*, On the Influenza in 1767 (and in Med. Trans., vol. i.). Lond., 8vo, 1768.—*A. Pope*, Il Medico Clinico, o Dissertazione sulla Constituzione Catarrale nell' Anno 1767. Nap., 8vo, 1768.—*Polidori*, in Raccolta di Opuscoli Medico Pratici, vol. vii. Firenza.—*J. Fothergill*, in Mem. of the Med. Soc. of London, vol. iii., No. 4; and in Med. Obs. and Inq., vol. vi.—*D. Battini*, Saggio sopra il Catarrho Russo. Siena, 8vo, 1782.—*A. Broughton*, Observations on the Influenza of Bristol in 1782. Lond., 8vo, 1782.—*Müller*, Beschreibung der Epidemie, 1782. Giess., 8vo, 1782.—*B. Galliceio*, Saggio sopra il Morbo detto Russo. Vicenza, 8vo, 1782.—*J. Murusen*, Kurze Nachricht von den Epidemischen Schnupfenkrankheit. Hamb., 8vo, 1782.—*W. Grant*, Observations on the late Influenza in 1775 and 1782. Lond., 8vo, 1782.—*De Mertens*, in Observ. Med., tom. iii., c. 4.—*P. D. Leslie*, An Account of the Influenza in the City of Durham in 1782. Lond., 8vo, 1782.—*M. Rosa*, Schedæ ad Catarrhum quem Russum nominant. Modena, 1782.—*Mursinna*, Von der Influenza, 1782, in Ej. Med. Chir. Beob. Samml., ii., part i.—*J. Clark*, Letter on the Influenza in Newcastle. London, 8vo, 1783.—*J. D. Metzger*, Geschichte der Epidemie, 1782. Konigsb., 8vo, 1783; et Geschichte der Frülings Epidemie im Jahre 1800. Altenb., 8vo, 1801.—*T. Glass*, in Med. Obs. and Inq., vol. vi. Lond., 1784.—*J. Pringle*, in Ibid., 1784.—*G. Baker*, in Ibid., 1784.—*W. White* and *W. Thompson*, in Ibid., 1784.—*R. Hamilton*, Remarks on the Influenza of 1782. Lond., 8vo, 1786.—*S. May*, in Med. Comm., vol. xiv. Lond., 1788.—*J. Lindsay*, in Ed. Med. Comment., vol. xvii., 1789.—*Parr*, in Ibid., vol. ix., part i., p. 226.—*W. Currie*, Account of the Influenza of 1789. Philad., 8vo, 1790; and in Philadelph. Trans., vol. i., part i., No. 11.—*Smyth*, in Med. Communicat., vol. i., No. 2.—*A. Fothergill*, Of the Epidemic Catarrh in Northampton, 1755; in Mem. Med. Soc., vol. iii. Lond., 1790.—*B. Rush*, Account of the Influenza in Philadelphia in 1789, 1790, 1791, in Med. Inquir., vol. ii., No. 7. Philad., 8vo, 1792.—*T. M. Kelson*, A few Remarks on the Nature and Cure of Colds. Lond., 8vo, 1798.—*Warren*, in Mem. of the Med. Soc. of London, vol. vi., App. Transact. of the College of Physicians, vol. iii. Essay on the Nature and Cause of the Influenza. Lond., 8vo, 1803.—*A. Carrick*, On the Influenza of Bristol in 1803, in Ann. of Med., vol. viii., 1803.—*A. Duncan*, On the Influenza at Edinburgh in 1803, in Ibid., 1803.—*J. Herdmann*, Discourse on the Causes, Symptoms, Nature, and Cure of the Epidemic Diseases termed Influenza. Lond., 8vo, 1803.—*Hooper*, Observations on the Epidemical Diseases, &c. Lond., 1803.—*J. Nott*, On the Influenza as it prevailed in Bristol, &c., 1803. Lond., 8vo, 1803.—*J. N. Scott*, On the Influenza in the Isle of Man in 1803, in Ann. of Med., vol. viii., 1803.—*R. Pearson*, Observations on the present Epidemic Catarrhal Fever and Influenza. Lond., 8vo, 1803.—*Saillant*, Tableau Historique et Raisonné des Epidémies Catarrhales; et sur la Grippe depuis, 1510–1800. Par., 8vo, 1803.—*J. B. Vieuld*, Essai sur la Constitution de l'An. xi., et sur les Epidémies Catarrhales. Par., 8vo, 1803.—*M. Cabirau*, Rapport fait à la Société de Médecine sur l'Epidémie connue sous le Nom de Grippe. Toulouse, 8vo, 1806.—*J. del Chiappa*, Saggio d'Istoria sul Catarrho Epidemico. Lucca, 8vo, 1806.—*P. J. G. Cabanis*, Observations sur les Affections Catarrhales. Par.,

8vo, 1807.—*Wolff*, in *Hufeland*, Journ. der Pr. Heilk., b. ix., st. 4, p. 92.—*Zeviani*, in Memorie della Società Italiana, vol. xi., No. 26.—*Petit*, in Dict. des Sc. Méd., tom. xix., p. 351. Par., 1817.—*G. F. Most*, Influenza Europea, &c. Hamb., 8vo, 1820.—*T. Hancock*, in Cyc. of Pract. Med., vol. ii., p. 815. Lond., 1832.—*A. T. Thompson*, in Lancet, vol. i., 1834, 1835, p. 799.—*C. Clark*, in Ibid., vol. i., 1836, 37, p. 523.—*Clutterbuck*, in Ibid., p. 676.—*Stevens*, in Ibid., p. 744.—*Wansbrough*, in Ibid., p. 789.—Editor, in Ibid., p. 871 and 908.—*Bryan* and *Phillips*, in Ibid., vol. ii., 1836, 1837, p. 113, 114.—*H. Bullock*, in Medical Gazette, vol. xix., p. 700.—*Wakefield*, in Ibid., p. 705.—*J. Clendinning*, in Ibid., p. 780.—*R. Macleod*, in Ibid., p. 784.—*Greenhow*, in Ibid., vol. xx., p. 9.—*Heberden*, in Ibid., p. 50.—*Morgan*, in Ibid., p. 115.—*Graves*, in Ibid., p. 785, 856.—*H. Gouraud*, in Encyclographie des Sc. Med., Avril, 1837, F., p. 37.—*P. Blakiston*, A Treatise on the Influenza of 1837, as observed at Birmingham. Birmingham, 8vo, 1837; and in *J. Johnson's* Med. and Chirurg. Review, No. lv., p. 168.—*T. M. Ward*, in Trans. of Med. and Phys. Soc. of Calcutta, vol. vi., p. 124.—*L. Leitao*, in Brit. and For. Med. Rev., April, 1838, p. 557.—*Otto*, in Ibid., p. 558.—*J. N. Streeten*, Report upon the Influenza, or Epidemic Catarrh of 1836-7, in Trans. of Provin. Med. Associat., vol. vi., 8vo. Lond., 1838, p. 67.—*H. Schweich*, Die Influenza, &c., 8vo. Berlin, 1836.—*G. Gluge*, Die Influenza oder Grippe, &c., 8vo. Minden, 1837; and in Brit. and For. Review, No. xiii., p. 95.

[Ad. Bibliog. and Refer.—*Henry Holland*, Medical Notes and Reflections. London.—*Samuel Forry*, in New-York Journal of Medicine and the Collateral Sciences, vol. i., p. 64; Brit. and Foreign Med. Review, Jan., 1839.—*Joseph A. Gallup*, Sketches of Epidemic Diseases in the State of Vermont, &c. Boston, 1815, 8vo. (Dr. G. notices particularly the epidemics of 1789 and 1807, the latter of which, he states, prevailed all over the United States, Canada, and Europe. It seems to have appeared simultaneously in the city of New-York and the northern parts of Vermont.)—*Noah Webster*, A Brief History of Epidemic and Pestilential Diseases, with the Principal Phenomena of the Physical World, 2 vols., 8vo. Lond., 1800.—*Thomas G. Watkins*, in Medical Repository, vol. xii., p. 5.—*Shadrach Ricketson*, in Ibid., vol. xii., p. 13; vol. xi., p. 190, 235, 404, 238, 271.—*Benjamin Rush*, Medical Inquiries. Phil.—*Samuel H. Dickson*, Essays on Pathology, Therapeutics, &c., 2 vols., 8vo. Charleston, 1845.—(See *Bibliog. and Refer.* to Art. Inflammation.)]

INSANITY.—Syn. *Μανια, παραφροσυνη, παραφρονια, παραφρονησις*, Hippocrates, Galen. *Paraphrosyne, Paraphobia, Dæmonia, Dementia, Moria*, Auct. Lat. *Mania*, Boerhaave. *Amentia*, Vogel, Sagar. *Delirium Maniacum*, Hoffman. *Phrenitis Apyreta*, Sauvages. *Vesania*, Linnæus, Cullen, Parr. *Ecphronia*, Good. *Mania Universalis*, Young. *Unsinnigheit, Tollheit, Schwermuth, Mondsucht.* Germ. *Folie, Démence, Phrénèsie, Manie*, Fr. *Mania, Insania*, Ital. *Madness, Mental derangement, Lunacy, Mental aberration, Unsoundness of Mind.*

Classif.—2. *Class*, Nervous Diseases; 4. *Order*, Mental Disorders (*Cullen*). 4. *Class*, Diseases of the Nervous Function; 1. *Order*, Affecting the Intellect (*Good*). I. Class, III. Order (*Author in Preface*).

1. Defin. *A deviation from, or perversion of, the natural and healthy state of the mind, as manifested either by the moral emotions and conduct, or by a partial or general disorder of the intellectual powers and understanding.*

2. *Insanity — Insanitas* — was formerly employed to signify a deranged state of the health, either of body or mind; but it became more especially applied to mental disorders—*Insania*—and lately has been entirely limited to them. It may be considered to comprise all morbid manifestations of mind, whether partial or general; or, with whatever series of symptoms they may be accompanied, whether with those of excitement or of depression of any of the functions, either of mind or of body. Insanity, however, and especially certain moral states of it, is often nothing more than an exhibition of the natural character and moral disposition of the individual, over which reason has ceased to exercise its control, or which has become remarkably prominent, or even perverted by excessive indulgence and unexercised restraint. The inordinate gratification of passions or moral emotions not only gradually weakens the influence of reason and of self-control, but also imparts to these emotions a perverted and truly morbid character, and allows them to assume forms at variance with the established opinions and habits of the world, and with the laws of society.

3. It is extremely difficult, if not impossible, accurately to *define* insanity, or to draw a line of demarcation between it and what has usually been denominated singularity of opinion, or eccentricity of conduct. The latter states, viewed either in their moral or in their intellectual relations, insensibly pass into various acknowledged varieties of the former, and are often merely states of transition from the healthy mental manifestations to a condition indisputably morbid. Since the time of Locke, it has generally been considered that the insane have not lost the power of reasoning; but having entertained as real, some illusion or erroneous impression, they err, by reasoning from wrong premises. This idea appears to have been adopted by Cullen, who remarks, that "there is generally some false perception of external objects, and that such false perception necessarily occasions a delirium or *erroneous judgment*, which is to be considered as *the disease*." But this too limited a definition was more extended where he states insanity to be "in a person awake, a false or mistaken judgment of those relations of things which, as occurring most frequently in life, are those about which the generality of men form the same judgment, and particularly where the judgment is very different from what the person himself had before usually formed." But, as Dr. Prichard has remarked, these definitions apply only to one class of cases, and especially to *melancholia, monomania*, or *partial insanity*—to those forms, in which certain illusions exist, and the judgment is *comparatively* clear on all other topics unconnected with the illusions entertained. But, although the judgment seems comparatively clear on other topics than those connected with the morbid illusion, yet it must not be considered, with Locke, that the insane make right deductions from their illusions. As Dr. Conolly has more justly observed, "the judgment is but the result of comparison; comparison is alternate attention; attention is a faculty dependant on the brain," and one, I would add, which is most early and most generally disordered in mental diseases. I therefore quite agree with this writer, that, in all cases, even of partial insanity, the judgment is more or less weakened and perverted.

4. Besides the above limited forms of insanity, there are others of a more general and manifest kind: namely, 1st. *Maniacal* or *raving insanity*, in which the mental manifestations are more generally and more severely affected, the derangement being characterized by great excitement, wildness, violence, and absurdity; 2d. *Imbecility*, and *incoherent* or *fatuous insanity*, in which the mind is altogether incapable of any effort; the intellects being remarkably im-

paired, and the ideas being rapid, unconnected, or incoherent. To the preceding forms, in which the *intellectual manifestations* are primarily and chiefly disordered, some recent writers have added another, viz., *Moral insanity*, in which the intellectual powers are but little, or not very manifestly impaired, the disorder appearing chiefly in the emotions, habits, and conduct. In this form of mental disease, the moral and active powers are perverted or depraved; self-government is either greatly impaired, or altogether lost, and the individual is incapable of conducting himself with propriety, in many of the relations of business and society. As Dr. PRICHARD observes, "his wishes and inclinations, his attachments, his likings and dislikings, have all undergone a morbid change; and this change appears to be the originating cause, or to lie at the foundation of any disturbance which the understanding itself may seem to have sustained, and even, in some instances, to form, throughout, the sole manifestation of the disease." It must not, however, be supposed that the understanding, in such cases, is altogether unaffected. It may not present any very obvious delusion or aberration from the usual condition, but it is certainly more or less weakened; and the patient is incapable, from habit or from impaired nervous power, of exerting those manifestations of mind upon which judgment and self-control depend, with the vigour and precision of health. Besides, the indulgence, or the inordinate excitement or sway of the emotions and passions leading to moral insanity, necessarily tends to weaken or to obscure the understanding, and ultimately to overturn it altogether.

5. While we observe insanity arising almost insensibly from the misdirection of certain manifestations of mind, from the excitement or the over-indulgence of others of these manifestations, and from the utter neglect of some of them, aided by an impaired power of attention and comparison, we not infrequently also perceive it to proceed from those diseases and injuries which affect, more or less remarkably, the functions, circulation, and organization of the body, and particularly of the brain and nervous systems: fevers in which vascular excitement becomes inordinate, or in which organic nervous or cerebral power is much depressed, frequently derange the mental powers in their course; and the derangement, owing to organic lesion produced in their progress, may become more or less permanent. The cerebral functions are generally disordered in the more severe cases of inflammation of the brain or of its membranes, and the disorder often assumes a most violent form; but it either entirely disappears, or partially subsides, with the removal of the organic condition upon which it depended, unless when the brain has sustained some injury that unfits it for the performance of its offices. In all these instances, however, the mental alienation is merely a consequence, or symptom of the bodily disease, which has assumed its specific form and character before the mental affection appeared. It must not, from this, be supposed that mental disorder is not, in its more chronic and primary forms, quite unattended by signs or symptoms of physical disease, referrible either to the system generally, or to the brain more particularly, or even to both. Cases of insanity are comparatively few, in which no indication of such disease is to be traced; the chief differences being the obvious nature, the extent, the duration, and the kind of bodily affection which has preceded, and which accompanies the mental disorder.*

6. When, however, insanity has proceeded from bodily disease, or from external injury, the latter either may have been entirely removed, or its effects only may remain; the former enduring either for a time, or more permanently, owing to the consequences of the physical affection upon the nervous power, or upon the intimate organization of the brain, and yet the organic functions may manifest little or no disorder.

7. *Insanity* may, therefore, be viewed as a generic term, comprehending every grade of *perversion* of the *moral*, or of the *intellectual*, or of the *instinctive manifestations of mind*, or of any two, or of all these classes of manifestations, from the healthy states—to such perversion, a more or less manifest but variable alteration of the *sensations*, *perceptions*, *judgment*, and *voluntary movements*, being usually added; or, in other terms, the essential phenomena of insanity are, a more or less manifest or extensive change of the functions of the brain from their accustomed healthy condition—of the sensibility, the perceptions, the intellectual and moral powers, the judgment, and the movements, without any profound, obvious, or durable affection of the organic functions.

8. Yet these latter functions are not always, or even generally, devoid of disorder. They have been too commonly either overlooked altogether, or imperfectly attended to, or insufficiently investigated; the predominance of disorder of the cerebro-spinal nervous system, and preconceived notions of the relations of mind to organization, and of the nature of insanity, entirely occupying the attention of the observer.

9. The history of medical literature, in respect of insanity, shows that the study of the malady, and a knowledge of its pathology and

* [It may be useful, in this connexion, to state that, according to the recent calculations of Dr. J. REID, founded on a very extensive series of observations, the average weight of the encephalon, between the ages of 25 and 55 years, is, in the male, 50 oz. 3½ dr. (avoirdupois); in the female, 44 oz. 8½ dr., giving a difference in favour of the male of 5 oz. 11 dr.: the average weight of the cerebrum is, in the male, 43 oz. 15¾ dr.; in the female, 38 oz. 12 dr.; of the cerebellum, in the male, is 5 oz. 4 dr.; in the female, 4 oz. 12½ dr.: of the pons and medulla oblongata, about one ounce.

The large comparative size of the brain in infants and young children is well known; and it is interesting to observe that, before the sexual desires are developed, the cerebrum appears to be absolutely larger in the male than in the female sex; thus, from one to four years, the encephalon in the male weighs 39 oz. 4¾ dr.; in the the female, 37 oz. 9 dr. A decided diminution in the average weight of the brain was noticed by Dr. REID in females above 60 years of age; but among males this was not apparent until a later period. This change is accompanied with an increase in the quantity of the cerebro-spinal fluid, which particularly accumulates in the sulci between the atrophied convolutions, as it does also in the brains of people in the prime of life, who have for some time been addicted to excessive indulgence in ardent spirits. The brain of CUVIER weighed 59 oz. 4 dr., and that of DUPUYTREN 59 oz., Troy weight. The brain of the negro has been proved, by TIEDEMANN, to be as large as that of the European and other races; but there is a deficient development in the anterior lobes of the cerebrum; the measure of the facial angle, therefore, as suggested by CAMPER, has been entirely abandoned by physiologists as a test for measuring the actual development of the brain.]

treatment, have been long influenced and retarded by prejudice and superstition, by attributing all mental disorders to supernatural agency, or by considering them in the spirit of system. It has been justly remarked by M. Foville, that works on mental alienation present the two principal characters distinguishing medical writings: the one class being dictated by observation, and containing information, the accuracy and the utility of which can never be impaired; the other imbued with the spirit of system, and manifesting all the follies that may be conceived. The chief advantage that can be derived from the latter class of writings is, to induce us to examine, for the guidance of our own opinions, the phenomena of mental disorder with the strictest attention; to limit ourselves chiefly to the description of what we observe, and to submit with the utmost caution to the ambition of explaining.

10. In *treating of insanity*, I shall closely adhere to the results of observation, and describe, 1. The phenomena, the essential and accessory symptoms; 2. The diverse forms and classification; 3. The terminations; 4. The organic lesions observed in fatal cases; 5. The predisposing and exciting causes; 6. The physiological pathology; and, 7. The treatment of insanity.—*Connate Insanity* or *Idiotcy*, *Puerile Imbecility*, *Puerperal Insanity*, and, lastly, *Suicidal Insanity*, will be afterward considered in distinct chapters.

11. I. Symptoms of Insanity.—The study of the phenomena of insanity, according to the several functions chiefly affected by it, is of great importance, not only in arranging the various forms of the malady, but also in classifying the patients, and in determining with precision and success the method of treatment. In the general view, therefore, which I am about to take of the essential and related symptoms of insanity, I shall consider, 1. Those furnished by the *sensibility*, or connected with the *impressions*, the *sensations*, and the *perceptions*; 2. The phenomena exhibited by the *instinctive*, the *intellectual*, and the *moral manifestations*; 3. The symptoms connected with the *locomotive apparatus*; and, 4. The phenomena furnished by the *organic functions*. In the *general description* here about to be entered upon, I shall confine myself to those states of insanity, the existence of which admits not of dispute, and leave, until I come to the consideration of the special forms of alienation, the discussion of those *states* which are the least manifest, or which have not been generally admitted as constituting forms of insanity, either from their *slight or partial nature*, or from the circumstance of the *moral manifestations* being chiefly affected, the intellectual powers being much less prominently disordered (§ 4).

12. i. The Symptoms furnished by the Sensibility are extremely numerous and diversified. They consist chiefly of false perceptions, arising from one or other of the following sources: 1st. From disorder of the organ receiving the impressions; 2dly. From an affection of the nerves conveying the impressions, the organ itself being sound; 3dly. From profound disease of the parts destined to perceive them, the morbid impression taking place without any external excitement or cause; and, 4thly. From disorder of the general sensibility; but, as will be shown in the sequel, false perceptions, or illusions, more frequently proceed from two or more of these sources, than from any one singly.

13. *A. False perceptions arising from a disorder of the organs receiving the impressions* are evinced by the state of these organs, particularly in regard of the presence of actual disease of them, and by the effects following the abstraction of their respective stimuli. The existence of disease will generally be ascertained upon a close examination of the sense whose functions seem especially disturbed; and it is not infrequently observed, both where disease of the sense exists and where it cannot be detected, that the shutting out of the appropriate stimulus—as by closing the eyes, or the ears, or the nostrils—arrests the morbid perception haunting the patient, by preventing the production of sensation. Esquirol, Reil, and Foville suppose that, where the morbid perception thus ceases upon shutting a particular sense, the cause of it exists in that sense: but this is not the case; the error arising from the circumstance of their confounding, with most of their countrymen, sensation with perception. A sensation will be morbid where the organ is disordered, but it will not necessarily be followed by a morbid perception, unless either the nerves conveying the sensation, or the brain itself taking cognizance of the sensation, be disordered, as respects either the state of its organization or circulation, or the discharge of its functions. In cases, therefore, where closing the organ of sense causes a morbid perception to cease, such perception is not to be referred altogether to the state of the senses, but partly also to the organ of intelligence—to the understanding, which is obviously incapable of correcting or judging aright the report conveyed by the sense especially affected. Indeed, the intellect may be so weakened as to be more than usually susceptible of derangement, either when inordinately excited by the senses, or when manifest disease of them exists. In cases of this description, the mind is incapable of paying due attention to the various circumstances connected with the morbid sensation or impression, of comparing them, and of judging them as in health; and this obtains especially when the sensation is novel, or even indistinct, as well as when it is inordinate, or too strong, relatively to the nervous sensibility—to the cerebral power of the patient; and when it either forcibly or unusually impresses a mind already more or less deranged. Although, therefore, the disorders referrible to the senses, as ophthalmia, amaurosis, otitis, ozena, caries of the teeth, &c., are sometimes concerned in the production of false perceptions in the insane; yet equally much, if not more, is to be imputed to the brain itself, and to its functions, which are mainly concerned in producing the morbid perception, and are obviously incapable of ascertaining the illusion: the morbid *sensation* appertains to the sense, and the nerves connected with it, but the false *perception* is chiefly the act of the brain.

14. *B. False perceptions without disease of the organs of sense.*—False perceptions of this kind have been called *illusions* by some, and *hallucinations* by others. M. Esquirol proposes to confine the latter term to them; and he de-

fines them to be sensations perceived at a time when there are no appropriate external objects present to excite them in the organs of sense. This class of false perceptions is much more common than the foregoing, and occurs in every possible form. Both the blind and the deaf may be subjects of illusions of the senses of sight and hearing respectively. The majority of those who are haunted by hallucinations of this kind suffer more in solitude, in darkness, and during silence, when the senses are in a state of repose, than in other circumstances. The distractions, incitements, and sensations experienced in society sometimes allay or obscure these illusions; but, however powerful, much more frequently they have no such effect, the mind continuing, nevertheless, to be engaged only with its morbid perceptions. The patient, when he speaks, is interrupted by them; he answers to voices which call upon or address him, or contemplates objects which have no existence.

15. Sometimes the illusions relate to one sense, and occasionally to more than one, or even to all the senses. Those of hearing are the most common; next those of sight, smell, and taste; the illusions connected with the two last being often associated. Those belonging to the sense of touch are the most rare.

16. DARWIN supposes that hallucinations proceed from inflammation of the origin of the nerves of sensation; and M. ESQUIROL says that "the false sensations of those subject to hallucinations are images and ideas reproduced by the memory, associated by the imagination, and personified by habit. A person in such a state converts the product of the understanding into a corporeal form; he dreams while he is awake; but, in those who dream, the ideas which were entertained while awake continue during sleep, while he who is in a delirium perfects his dream when waking." M. FOVILLE justly remarks upon this opinion of M. ESQUIROL, 1st. That hallucinations often do not furnish precise or determinate sensations like those which memory recalls—confused objects, or vague sounds, &c., are frequently only seen or heard. 2d. With many, however diversified or rapid the succession of ideas engaging the imagination, the illusion continues limited to one sensation, and is always reproduced in the same form; the patient always sees the same object, hears the same voice, or inhales the same odour. 3d. The delirium of the insane depends, in many cases, upon false sensation. All the wanderings of the mind are only the consequences of this. When patients recover, they say, "I have seen and I have heard as distinctly as I now see and hear you," while, at the same time, they are able to give an account of the errors of their imagination. 4th. In some insane persons, the hallucinations have preceded the delirium, and have been recognised by the patients themselves at the commencement as false perceptions; but at a later period, when combined with intellectual derangement, they have been regarded by them as real. Lastly, one sometimes finds, in cases of hallucination, changes of the nerve destined to convey impressions; and although it may not be readily conceived how an alteration of the optic nerve, for instance, determines false perceptions relative to vision, it cannot be more easily explained wherefore disease of a nerve of motion in neuralgia causes involuntary movements of the muscles; we may as well believe that alteration of the nerve is the true and sole cause of the hallucination, although in the healthy state the will may be the only cause of voluntary motion, as that external excitants, the impressions on the organs of sense, are, in health, and during waking hours, the only natural cause of all sensation and of all perception. There is, besides, this analogy between the two cases, that neuralgia of a nerve of motion does not ordinarily bestow the influence of the will on that nerve, and by consequence upon the muscles, and that the alteration of a nerve of sensation giving rise to hallucinations does not destroy the perception of sensorial impressions, although it often disturbs and impedes them.

17. It is much better supported by close observation and *post-mortem* research, and hence much more probable, that illusions or hallucinations arise from lesions of the nervous parts intermediate to the organs of sense and the centre of perception, or from alterations of the parts of the brain into which the nerves of sensation enter, or in which they terminate. Illusions similar to those which occur in the insane sometimes take place in persons whose intellects are sound; but a healthy understanding appreciates the false perception correctly, whereas the disordered mind confounds them with realities. It may hence be inferred that they are the effects of lesions which do not necessarily or constantly implicate the understanding, but which more frequently, owing to intensity or extent, affect the intellectual faculties, and especially the powers of attention and reflection.

18. Whatever may be the point of organic departure of hallucinations, they are lively or sad, capable of inspiring sentiments of benevolence, or of arming the hand of the maniac with an instrument of homicide. The supporters of the doctrine of GAUL suppose that the characters they assume entirely depend upon the portion of the brain affected—upon the point in the organ whence they proceed. The effects, however, of hallucinations upon the minds of the insane are undoubtedly as real and as positive as the impressions produced by external excitements.

19. *C. Delusions or false perceptions connected with the general sensibility.*—These disorders, from the most simple and circumscribed to the most general and complicated, are constantly met with in mental diseases. Persons who believe that they have in the belly, or in the chest, or in the head, an animal which preys on them, are as much the subjects of disordered sensations as those who say that they are without a stomach, or a heart, or head, and who otherwise are tormented by the most strange feelings. Those who believe that they have the devil in their bodies are victims of morbid sensations, which their disordered mental faculties refer to this cause. In many cases the delusion, false perception, illusion, or whatever else this kind of symptom may be called, evidently results from a state of suffering—from disease in the parts to which the delusion is referred. They are, in fact, symptoms dependant upon local lesion, traces of which are generally discovered on examination after death,

the morbid sensation being misinterpreted by the erring judgment of the patient. M. Foville justly remarks that, without the state of pain, or morbid sensation, occasioning the delusion, the delirium of the insane might take another direction, and might be more easily appeased; and that one of the most efficacious means of attaining this object is to remove, when this can be done, the pains or sensations which give rise to the delusion.

20. In some instances the delusion is unattended by any appreciable disorder of the part to which it is referred. It may depend, judging from analogy, upon an alteration in the nerves conveying impressions made in parts which they supply, or to which they are distributed; or even in those which are connected or sympathize with a disordered structure. The well-known example of pain referred to parts removed by amputation may be adduced in support of this view. From what has now been stated, the delusions depending upon the general sensibility may be divided into, 1st. Those which seem to proceed from some alteration or lesion of the parts to which they are referred; and, 2d. Those which seem to depend rather upon the state of the nerves transmitting the sensations, or upon the nervous centres themselves, than upon any appreciable lesion of the parts which are the seat of the delusion.

21. *a. Delusions with lesion of the parts to which they are referred.*—Many instances of this kind of delusion have been mentioned by authors. M. Esquirol states that in one of his patients there existed considerable tension of the abdominal muscles, with tenderness of the abdomen. The devil, the patient said, had placed a cord from the pubis to the sternum, and a demon in her body, which burned, pinched, and bit her heart, and tore her entrails. Among other alterations found after death, the usual changes consequent upon chronic inflammation of the peritoneum and pericardium were found. Here the relation between the symptoms of the physical change and the mental delusion is sufficiently manifest. The same writer, among other instances, mentions the case of a female who believed that she had no longer any body, and that it had been carried away by the devil, for she felt nothing. M. Esquirol inserted a pin under the skin of her arm without causing any evidence of pain. The loss of sensibility was evidently in this case connected with the production of this particular delusion. Another female fancied that the devil lay with her: she had constant pain and tenderness in the region of the uterus; and these were doubtless connected with the origin of the insane idea. There is here a very evident similarity of these delusions to the false perceptions attending disease of an organ of sense. All these morbid sensations are correctly judged, and their real natures appreciated by the sane mind; but the disordered intellect is unable thus to recognise them, variously transforms them, and contemplates the forms into which it changes them, as real existences; superstition, previous habits and occupations, predominant feelings and religion, severally imparting to them the shapes which they assume, or the colour and character which they present. Similar to the above instances is one mentioned by M. Foville. A man who received a severe wound at the battle of Austerlitz continued insane ever since. His delusion is founded on that which he no longer recognises; he has lost the sensibility of the surface, and he believes that he no longer exists. He says that that which you see there is not him; that it is a machine which has been made to resemble him, and which is very badly made. This man often falls into a state of complete immobility and insensibility, which last several days. Vesicatories and sinapisms never produce the least signs of pain. He often refuses to eat, saying that the machine which has replaced him has no belly, and that it has no need of food. His external surface and extremities evince no sensibility. The strange delusion which this patient labours under is manifestly founded on the loss of sensibility in these parts, and on the absence or marked modifications of organic sensibility.

22. *b. Delusions connected with the general sensibility that are independent of alteration of the parts to which they are referred*, seem to be more rare than those in which some lesion or other exists. It is the reverse in regard of false perceptions connected with the special sensibility —with the organs of sense. Not infrequently, however, these different kinds of false perception—of delusion and hallucination—are associated in the same case. The delusions of most insane persons have more or less reference to, or are influenced by their education, their habits, their prejudices, their studies, their fears, &c., and are often attributed by them to sorcery, to demons, to various physical causes, &c. A weak, superstitious person believed that he had the devil in his belly. For a long time he could not make out how he got there; but he at last fixed upon the idea that his father sold him to the devil in the presence of a notary for a sum of money. Just before he was taken ill, this young man accompanied his father to a notary, where they met a stranger who paid the father some money. This was in hot weather, and, on leaving the notary's office, the young man took some glasses of bad cider, and he complained soon after of pains in the abdomen, which have since continued to afflict him; and it was upon this circumstance he based his delusion.

23. Too great importance cannot be attached, in the practice of mental disorders, to the various lesions of sensibility, or too much attention paid to false perceptions and delusions of all kinds, both as respects their connexion with physical lesion, and as regards their consequences, or influence, upon the subsequent course of the malady. It is very manifest that the patients who are the most dangerous to themselves and to those who are about them are those who are subject to some one of these false perceptions or delusions. One insane patient hears a voice, which says to him, kill him or them. He resists the impression for some time; but at last believes it to be a supreme command, and obeys it. Another has recourse to suicide, either to avoid the punishment or distress of these hallucinations, or in obedience to orders, which he believes he has received from the Almighty, and which he is bound to execute. There is much more reason to distrust a maniac who is subject to delusions, or

hallucinations, and to exercise strict control over him, than one who is not so afflicted.

24. All the foregoing kinds of false perceptions require also very close observation, especially with reference to their physical relations —to the states of the organs to which they are referred—in order that appropriate methods of treatment should be employed. It is obvious that, if the delusion be founded upon, or in any way connected with, functional or structural lesion, means should be used to remove such lesions; for, as already shown (§ 19), organic disorder either occasions, or perpetuates or aggravates the morbid sensation, which the deranged mind perceives or construes falsely.

25. *c. Various other lesions of sensibility are often observed.*—Insane persons often tear themselves with their teeth or nails, without manifesting the least pain. Some eat straw, grass, &c.; some even their own excrement; and others gnaw their fingers or extremities. Patients have, in a few instances, picked or scratched parts of their own bodies, until large cavities or holes have been thereby made (ESQUIROL, FOVILLE, &c.). Some possess a remarkable power of bearing, without suffering, extremes of heat and cold. Some authors allege this to be general among the insane, but this is an error: the greater number do not manifest any sensible difference in this respect from the healthy. Others deny this altogether; but it is certain that many insane persons bear, without appearing to suffer, and without feeling the least inconvenience, the most excessive cold. CURRIE, RUSH, ESQUIROL, FOVILLE, and others, cite numerous instances proving this circumstance, not the least coryza, or catarrh, or complaint whatever having followed the exposure to cold. Some patients can fix their eyes upon the most intense light, and even upon the sun, without being dazzled thereby. M. FOVILLE adduces several instances where vision was by no means weakened by having the eyes fixed for some time upon this luminary in the month of July, the patients being able to read immediately afterward, a book printed in very small characters. Most insane persons readily addict themselves to the use of tobacco. They smoke, chew, or snuff it with avidity, females as well as males, when they can obtain it.

26. ii. SYMPTOMS APPERTAINING TO THE MORAL, INTELLECTUAL, AND INSTINCTIVE MANIFESTATIONS OF MIND.—The disorders of these manifestations are as numerous as the possible combinations of our ideas, and as diversified as our passions, propensities, prejudices, affections, and education. They present themselves under two forms: in some cases they have reference only to a single train of ideas; in others, they comprise a greater number. It is especially to this class of symptoms that the French pathologists have applied the term *delirium*—the disorder of the mental faculties forming with them the delirium of the insane; and upon the limits or extent of this disorder has been founded the division of intellectual derangement, or of the delirium, into partial or exclusive, and vague or general. The mental disorder, moreover, may be evinced chiefly in the moral, or in the intellectual, or in the instinctive manifestations, or it may extend itself much more generally. It is according to the nature and extent of the disorder that arrangements of mental diseases have commonly been attempted. In the one class, whatever may be its limits or extent, there is only a perversion, or an aberration of the faculties; in the other, the faculties are altogether lost or obliterated; and this privation is either congenital or primary, or accidental or acquired. "Who is there," says M. ESQUIROL, "who can flatter himself to have observed, and to be able to describe, all the symptoms of mania, even in a single individual!" It is particularly to the very extensive class of symptoms now under consideration that this reflection is applicable. How are we, observes M. FOVILLE, to comprehend the fugitive and multiplied shades of general delirium? How are we to trace the infinite subtleties of partial delirium or monomania? In *general delirium*, or *maniacal* and *incoherent insanity*, ideas the most extravagant, images the most fantastical, associations the most discordant, emotions the most opposed, succeed each other with electric rapidity. The maniac confounds in his mind heaven, earth, and hell, his domestic affairs, his affections, politics, and morals. He speaks in verse, sings, laughs, weeps; utters his sentences with marked or peculiar emphasis; he speaks by turns in all the languages he may know; retraces his steps, lifts or extends his hands, or tosses them right and left; dances, jumps, and utters menacing cries; rushes on his companions, tears all that come in his way, strips himself naked, rolls on the ground, &c. In these cases the functions of mind are not destroyed, but they are morbidly excited—they are actively deranged—and are no more like their healthy condition than convulsions resemble the quiet walk of a man in health. On the other hand, in *partial insanity*, or monomania, the mind is concentrated upon one object or train of ideas, whatever it may be. The patient displays infinite resources to justify his error, and applies the most imperturbable attention in pursuit of it.

27. Disorders of the passions, and more especially of the intellectual faculties, particularly characterize general or maniacal insanity; disorder of the affections chiefly mark partial insanity, the intellectual faculties being but little affected. It is in the former that the greatest agitation is observed, many patients vociferating day and night, until their voices become in a short time so altered, that, in spite of their efforts, they cannot be heard at the distance of a few paces—a species of *aphonia* peculiar to the maniac. Although this aphonia is partly caused by the efforts to cry, still it seems to be in some degree owing to the state of nervous influence, for some patients evince it from the very accession of their malady. Some maniacs present the peculiarity of repeating all their actions, questions, or expressions, or even their discourses, a certain number of times. The simple repetition of these acts or expressions has been referred to a want of harmony in the action of both hemispheres of the brain; but the repetition is sometimes oftener than once.

28. Among maniacs are found instances of erotic excitement, of an exaltation of parental or filial affection, or of the ties of friendship. Some are ferocious, others quarrelsome, others have a propensity to murder, or to steal; and many are remarkably cunning and deceitful.

All large establishments contain maniacs of pride; princes, sovereigns, great dignitaries, and even gods themselves, are not rare. Vanity is observed in all its extravagances, furnishing the best lesson to the vain fools who strut their hour on the stage of modern society. Here are found patients a prey to the most distressing anxiety, to the utmost mental agony; seeing in the present and in the future nothing but despair, imploring death, and desirous of inflicting it upon themselves, in order to escape from their miseries. Some dream of nothing but change, of distant journeys or voyages; others have lost their memory of persons or of things; and several, particularly during the exacerbations of the disease, can no longer speak their own language, but give utterance instead to confused and fantastical sounds, delivered in the tone of a continued discourse. Painters, musicians, and artists of all kinds, appear among those whose education has not been directed to the arts; and even poets, or, at least, rhymers, spring up among those who even have not learned to read. Visionaries of all kinds abound; some apply themselves incessantly to the solution of the greatest problems of nature, or of the most difficult questions in metaphysics, religion, politics, political economy, &c., although uneducated; and prophets, saints, and martyrs are not uncommon.

29. Ought it to be inferred from all these varieties, as regards the intellectual disturbance, that each of them is connected with an isolated and distinct lesion of a particular part in the brain? Ought we, in the present state of our knowledge, to admit that the organ of the understanding is composed of an assemblage of particular and distinct organs for each propensity, and for each endowment? Ought we, in fact, to adopt, to its full extent, the psychological system, according to which these questions are answered in the affirmative? It would be out of place here to discuss the real value of a psychological system; but it becomes necessary to notice the assertions of those authors who maintain that, in partial insanity, particular forms of the skull correspond with the varieties of the mental affection; that they are able even to trace the propensities, the talents, the dispositions, and dominant ideas of their patients. However, impartial observation of the insane, as M. FOVILLE very justly remarks, does not confirm the accuracy of these assertions. This writer, whose experience is most extensive, and powers of observation very great, states that it is certain that the same partial delirium, in many patients, corresponds to opposite forms of the same part of the skull. In some religiously insane, he has found the superior and middle part of the cranium remarkably developed, while, in others, the same portion was much below the ordinary magnitude. The insane who suppose themselves kings, emperors, princes, &c., are far from presenting, generally, a marked development of the regions of the organs of ambition, domination, vanity, &c., as assigned to them in the system of GALL, but are often inferior in this respect to those who pass the whole day in sweeping or cleaning the courts, &c., or who are most interested in the most menial occupations. If there exist distinct organs for every faculty or propensity, it is not necessary, I admit, that their development should be at all extraordinary, in order that irritation or inflammation should excite their activity, or occasion prominent or peculiar phenomena as respects them. But it may be stated, at once, that we often find, in cases of partial insanity, lesions as extensive as in those where the mental disorder was general; and that we occasionally observe instances of partial delirium that cannot be the result of the excessive, or of the irregular exercise of any fundamental faculty, or of vascular disorder limited to any particular part of the brain, to which such partial affection may be referred, even by those who espouse the doctrines in question. To the lesion of what fundamental faculty does the insane notion of a man correspond, who believes himself changed into a woman, *et vice versâ*? or of a person who believes himself transformed into a dog, assumes his habits, barks like him, walks on all fours, bites, &c.!

[We believe it may be sufficiently demonstrated, from a wide deduction of facts, as well as observation and analogy, that the brain, although apparently constituting a *unit*, consists, in reality, of an aggregate of parts, essentially distinct, and endowed with different functions. All physiologists must admit that the brain is the seat of intellect and of instinct, the centre of sensation, and the chief fountain of nervous agency; and that it receives successive additions in different animals as they rise in the scale of creation, and become endowed with additional instincts; but all are not ready to admit the plurality of cerebral organs, or to agree as to the uses and number of the component parts. We need only point to the diversity of opinions among metaphysicians to show that they have signally failed in tracing the connexion of mind with the cerebral organs, drawing, as they do, their information from consciousness, which differs in different individuals, and which does not even tell us in health whether we have a brain or not. Pathology has thrown much light on this otherwise intricate subject; but from the fact that injury or disease of the brain causes constitutional disturbance and morbid sympathies proportioned to the irritability of the patient, and not to the extent of local injury; as the brain is a double organ, and lesions rarely involve more than one hemisphere; and as the ability to observe what mental faculties suffer from disease of particular cerebral parts, presupposes an acquaintance with the number and nature of these powers, and the situation and limits of these parts, it is by no means wonderful that medical men have not always succeeded in the same inquiry, or that differences of opinion on this subject should still prevail in the profession.

From a somewhat extended examination of the doctrines of phrenology, as taught by GALL and SPURZHEIM, we have been led to believe them generally founded in nature, and in harmony with the best established principles of physiology and philosophy, and of primary importance to the physician who desires to make himself thoroughly acquainted with the causes, seat, and treatment of disordered intellect. To recapitulate, we suppose, for example, it must be admitted that the mind is endowed with a plurality of innate faculties; that each of these fac-

ulties manifests itself through the medium of an appropriate organ, of which organ the brain is a *congeries*; and, lastly, that the power of manifesting each faculty bears a constant and uniform relation, *cæteris paribus*, to the size of the organ, or part of the brain, with which it is more intimately connected. It may, however, perhaps, admit of doubt whether, in all instances, these organs have been accurately located, or that it is always possible to ascertain the relative size of these organs during life, by observing the different forms of the skull to which the brain gives its shape. (See COMBE on *Mental Derangement.*)]*

30. It may be truly said of partial insanity, that whatever, in the course of a man's life, may be to him an object of a particular regard or propensity, of a distinct taste, of a ruling passion—all the bizarre or fantastical ideas which his mind may entertain, may, in a state of disease, become the subjects of his delirium or hallucination; that many delusions, many forms of partial insanity, cannot really be referred to lesion of a particular faculty, or of that portion of the brain which has been considered the origin of such faculty; and that, in short, where it appears reasonable to refer them to an alteration of this kind, attentive examination of the conformation of the skull is far, in the majority of cases, from corresponding to the assertions of the authors of the psychological system in question. It must not, however, be inferred, from what has just now been advanced, that attentive observation of the forms of the skull of the insane is of no use; on the contrary, a regularly developed cranium, of a reasonable size, ought, *cæteris paribus*, to assist an opinion, as to the possible issue of the disease, very different from that inferred from a small, confined, and deformed skull. What has been stated applies only to the assumed seats of fundamental faculties, exclusively or principally affected in certain patients. In short, the disorders of the intelligence in the insane are partial or general, as regards the intellectual faculties, properly so called, and likewise in respect of the passions and affections.

31. In a very great majority of cases the insane are unconscious of the state of their minds, and are offended at being considered mad. They even accuse those of insanity who do not admit the integrity of their intellects. Some, on the contrary, are conscious of being deranged, but are unable, nevertheless, to correct the aberrations of their reason. These rare instances show what benefit may be expected to result from attempts to convince an insane person that he is deranged.

32. iii. THE SYMPTOMS FURNISHED BY THE LOCOMOTIVE ORGANS.—The disorders of voluntary motion in the insane may be divided into, 1st. Those which are temporary and local; and, 2dly. Those which are persistent and general. —*a*. In many, the movements become remarkably vigorous and energetic; an irresistible inclination to run, jump, gesticulate, &c., manifesting itself, produced by the general irritation which occasions the mental affection. These, however, cannot be regarded as important or specific alterations; but sometimes, during the paroxysms of the alienation, the muscles of the face, or of an arm, or of a leg, are agitated by *irregular movements, like convulsions*, which are strictly local, are very distinct from the general convulsions of epilepsy or hysteria, and resemble the involuntary movements attending neuralgia. These irregular and convulsive actions of the muscles of a single part or limb are met with chiefly in the intermittent or paroxysmal forms of insanity, or in exacerbations of the disease, and are evidently dependant upon the morbid condition of the brain, from which the paroxysms or exacerbations of mania result. They are only occasionally observed, and were first described by M. FOVILLE.

33. *b*. An incomplete and *peculiar form of palsy* is much more common in the insane than the foregoing local convulsive action, and is even much more serious. It is not mentioned by the older writers, and it is but slightly noticed by PINEL. M. ESQUIROL has studied it with much care, and especially with reference to the ulterior progress of the mental disease. More recently, MM. DELAYE, BAYLE, and CALMEIL have investigated it still farther. This affection, usually designated the paralysis of the insane, and general or incomplete palsy, consists of a general and gradual loss of power in the voluntary muscles. It commences with an embarrassment of the motions of the tongue, or with indistinct articulation. Patients hesitate for a time at some syllables, which they overcome only by an effort. They are unable to pronounce some letters—the R, for instance —or they express them with difficulty. Afterward, a similar embarrassment is observed in the movements of the arms, legs, &c.; and, lastly, in all the muscular system. The disorder possibly commences as early in the muscles of the limbs as in those employed in articulation; but as these latter require a greater precision of action for the due performance of

* ["To GALL and SPURZHEIM, and their followers, is due the great merit of having directed attention to those faculties which are the real source of action—the emotions and passions; and to them must be ascribed the praise of having originated the simplest, and by far the most practical, theory of the human mind. The phrenological question of the mutual relation existing between certain parts of the brain, certain faculties of the mind, and certain developments of the cranium, may be still a matter of doubt, and the practical advantages accruing from a knowledge of those relations a subject of controversy; but of the soundness of the theory, that the mind is a compound of several faculties, capable of acting either alone or in combination, varying greatly in power in different persons, and in the same person at different times, there can be no longer any reasonable doubt. Admit the theory of the separate existence and possible separate action of the several faculties of the mind—the reasoning faculties, the emotions or sentiments, and the passions—and it is not more difficult to imagine a moral than an intellectual insanity; allow that the several faculties, originally of different power in different persons, may combine in many different ways, and we have the materials of an almost infinite variety of character; the key to endless diversities of opinion, and the explanation of all that is most obscure in the motives and conduct of mankind.

"If it be conceded that the brain is the organ of the mind, and the mind is composed of various faculties, 'capable of acting alone,' as well as in combination, it follows, as a matter of course, that different portions of the brain must be allotted to the different faculties as their appropriate organs. On no other supposition can we account for the existence of partial genius, partial idiocy, monomania, or the phenomena consequent on wounds inflicted on different parts of the brain.

"The theory, then, of separate faculties, originally of different power, susceptible of improvement by education and habit, and of different degrees of excitement, from causes acting within the body itself or from without, manifesting themselves sometimes alone and sometimes in combination with other faculties, is the theory which best agrees with reason and experience."—(GUY'S *Principles of Forensic Med., Am. Ed.*, p. 257.)

their functions than the former, they more readily betray the incipient disorder, and this disorder is thus more early brought to the notice of the physician.

34. It requires, however, some experience to enable the physician to ascertain the commencement or earlier grades of this affection. When it has made some progress, the diagnosis is easy. The embarrassment of pronunciation is then very sensible. The patient cannot speak without throwing all the muscles of the face into action. The walk is vacillating; the motions of the arms and hands are unsteady and awkward, and these last constantly tremble, and are incapable of retaining a determinate position. It is not, however, as yet, the force, so much as the precision of the movements, that is impaired. A patient may squeeze any object with much power, but he cannot execute any delicate work, or even button his own vestments. In attempting to run, his course is irregular, or attended by deviations to the right and left, like to an intoxicated person; he exhibits the appearance of suppleness, but a state of morbid tension exists in all the muscles of the trunk, extremities, head, and face; he comes awkwardly down on the soles of his feet, his arms are extended, the eyelids are widely open, the jaws firmly closed. Sensibility becomes blunted, so that irritation of the skin is not perceived until after some time. The paralysis of the insane is often more marked on one side of the body than on the other; but sometimes the progress of the affection varies, or even alters materially in either side.

35. *c.* If this complication be observed with attention, *two distinct stages* may be recognised. In the *first*, the movements, although uncertain, retain a certain vigour—a rigidity of action rather than power. This gives way, after a time, to the *second*—to a relaxation—or a state of resolution, always increasing, of the muscular system. The patient becomes incapable of exertion; the features sink; the eyelids open sluggishly; the eye is dull; the jaws fall; the lips are pendent, and the excretions are involuntary. The patient is incapable of retaining a favourable position, and at last lies prostrate, the parts pressed upon by the weight of the body being excoriated, and ultimately gangrenous. In the course of this state of disease, attacks of cerebral congestion, followed by convulsions and coma, which continue for many hours, and are frequently repeated for several successive days, are often observed. After these attacks, the intellectual debility and aberration, and the paralysis, which are generally co-ordinate, are much more prominent. In many, variable periods, during which the symptoms are stationary, are interrupted by seizures of this kind, after which the malady proceeds rapidly, without ever retrograding, until the last degree of intensity is reached.

36. In the great majority of those who experience this complication, the paralysis does not commence until after the appearance of the intellectual disorder; but in some the insanity and palsy appear simultaneously; and in a few the muscular affection precedes the mental derangement. It should, however, be kept in recollection, that a general paralysis, similar in all respects to that now described, occurs, in rare instances, without being followed by insanity. I have seen several cases of this kind; and the circumstance has likewise been noticed by MM. Delaye and Foville.

37. iv. The Phenomena exhibited by the Organic Functions.—These functions present but little that is determinate, although they are rarely observed in a truly healthy state. Digestion is usually disordered in the earlier periods of insanity. The appetite is deficient or altogether lost, and more or less thirst is present. The mouth is clammy, and often dry; the tongue is white, with the papillæ often erect, or it is loaded or slightly furred, or covered by a slimy mucus. It is often red at its point and edges. The salivary secretion is commonly scanty or frothy, but in a few instances it is increased, or frequently rejected. The *bowels* are more or less constipated, and the *urine* somewhat coloured. These symptoms very often disappear under an appropriate treatment, the mental disorder continuing even without material change; and the appetite returns, or is even increased. Sometimes the appetite is excessive from the commencement, although the other symptoms just mentioned are all present. Costiveness is the most general and persistent symptom, often continuing through the whole course of the malady.

38. The *pulse* is sensibly accelerated in the majority of cases. Authors have erred remarkably—even recent writers copying the blunders of those who have preceded them—in saying that the disease is unattended by any disturbance of the pulse. Rush found the pulse affected in seven eighths of his cases; and M. Foville observed a large majority of cases of uncomplicated insanity, with more or less acceleration of pulse, the mean pulsations in those examined by him being 84 in the minute. In comparatively few the pulsations were under 70, and in none were they below 60. The *heart's* action is attended by increased impulse in the majority of cases; and in a few it is tumultuous, irregular, or even intermittent. In some it is weak, and almost inaudible, or insensible to the touch. Organic change of the organ, in some one or other of its numerous kinds, is very common, especially in old cases of insanity. M. Foville states that he found some alteration or other of the heart in five sixths of the cases of insanity that he had examined after death during three years. But these changes are accessory, or not necessarily connected with the mental disorder: they are even, in many cases, produced by it.

["From trials made by Dr. Pliny Earle upon 11 male patients labouring under *acute* insanity (ages averaging 33·81), it was found that the average pulsations per minute were 94·41: *maximum* individual average 119, in a person whose age was 52; and the maximum 74·7, in one whose age was 24. The patient, the average of whose pulse was the highest, was labouring under *melancholia*. 15 male patients labouring under *chronic* insanity (average age 38·4), the average pulse was 89 62 per minute: highest average 109·8, in a man 30 years of age; the lowest, 69·2, in one whose age was 67, subject to violent paroxysmal mania, the observations being made during a tranquil and lucid interval. 'By inspection of this table,' says Dr. Earle, 'it will be seen that the pulse in the chronic insane infringes on the general

law of diminution of rapidity with advancing age. Thus, the highest average but one is in a patient 64 years of age, and whose disease is of more than 20 years' standing, while the lowest but one is in a man but 26 years old, who has been deranged six or seven years.

"'In 13 male persons enjoying physical and mental health (average age 27), the average pulse was 80 per minute (when under active bodily exercise): highest average, 87; lowest, 74·5.

"The results of these trials in a tabular form are as follows:

	Mean age.	Mean number of pulse per minute.
Insane (acute)	33·81	94·41
" (chronic)	38·04	89·62
Sane	27·03	80·46

"These results show that the average healthy pulse is less, by 13·95 per minute, than that of those labouring under acute insanity, and less, by 9·16, than that of those having the chronic form of that disease. The average pulsations of the acute insane is 4·79 greater than that of the chronic. Other trials, made upon ten healthy male persons, under no active physical exertion (average age 25·5), gave 64·69 pulsations as the average per minute, showing the astonishing mean difference of 16·25 per minute, in the same persons, when employed in manual and other muscular exercise and when *not* so employed. The conclusion of the whole is, that the difference between the average of the acute insane and the sane, when not exercising, is 43·06; between that of the chronic insane and the sane, when not exercising, 44·7.

"'From the preceding investigations,' says Dr. Earle, 'the following conclusions may be derived:

"'1st. The pulse of persons labouring under acute insanity is more rapid than that of those in whom the same disease has assumed its chronic form.

"'2d. The pulse of the insane, whether the disease be acute or chronic, has a higher mean rapidity than that of the sane who are enjoying physical health.

"'3d. The general law of diminution in the rapidity of the human pulse, coincident *pari passu* with advancing age, is abrogated in the insane.

"'4th. In persons enjoying health, the rapidity of the pulse is nearly one quarter greater when they are under general, though not immoderate muscular exercise, than when they are in a state of comparative rest.'"

Dr. Woodward found, in 40 recent and excited cases, that the pulse averaged 80 in the males and 81 in the females. In 216 chronic cases, the pulse averaged 71 in the males and 72 in the females. In 54 cases of dementia, the pulse averaged 68 in the males, and 69 in the females.

In Dr. Wyman's returns, the general average of the pulse of 164 males was 74, and of 73 females, 85 per minute. The general conclusion drawn from all these facts is, that in insanity the average pulsations are quicker than in a state of health.]

39. v. Accessory Symptoms.—In all recent and acute, as well as in all prolonged cases, in which the symptoms have retained or assumed an acute character, obstinate *insomnia* is generally present. I have seen it often precede the mental disorder; and where the insanity presents an intermittent or paroxysmal form, it attends the accessions. This symptom is frequently most remarkably obstinate and prolonged, insane patients sometimes passing weeks, or even months, without the least sleep. When sleep is obtained, it is disturbed, dreaming, or wandering, or even raving. As to the symptoms furnished by the external aspect of the body but little can be stated, as they vary with the habits and conditions of the patients, and the stages of the malady. In the great majority of cases, the expressions of the countenance correspond with the nature of the ruling passions, which manifest themselves with so much the more energy and truth, as nothing counteracts their operation. The eyes are unfixed, unsteady, wild, or timid, and incapable of returning a determined or steady look. The conjunctiva is injected, and the conchæ of the ears more or less red. The cheeks are not always coloured similarly to these two parts; for they may be either pale, or red, or livid, while these present the highest degree of vascular injection. The skin is hot and dry, or hot and moist. The heat is greatest and most constant over the forehead, the extremities being frequently, at the same time, cold.

40. The co-existence of some important affection of the digestive, circulating, and respiratory organs with insanity sometimes imparts to the latter a modified or intermittent form. It is not rare to see phthisis breaking out during the progress of the mental disorder, and suspending it for a time. The patient, in this case, recovers his reason, while the pulmonary disease makes progress; but if this progress is arrested, the insanity returns; and these alternations often succeed each other until death takes place. Frequently an acute disease supervenes upon, and interrupts the course of, insanity, which reappears in all its severity after the accidental complication has subsided. M. Foville thinks that this effect is oftener produced by acute inflammations of the chest than by those of the abdominal viscera. And, lastly, an acute disease, thus occurring in the course of the mental affection, sometimes entirely suspends the latter, and is followed by complete recovery.

41. On passing in review the principal symptoms of mental alienation, disorders of the intellectual and moral powers only will be found constant. These disorders will often exist in persons whose sensations and movements are performed as regularly as in health; but they will also be frequently associated with morbid sensations, false perceptions, and delusions. In this latter case, the conversation and actions of the insane will be as much the results of these sensations and perceptions as the discourse and actions of reasonable persons are the results of external circumstances and rational inferences; the intellectual disorder then truly appearing to be chiefly the consequence of the affection of sensation and of perception. Where the mental alienation is associated with disorder of the voluntary movements, the connexion between both is very different from that existing between the former and the sensations and perceptions. The voluntary movements are disordered, as a contingent consequence of the lesion of the brain, that either is caused

by, or occasions, the mental disorder; and are hence merely a complication, but one indicating a hopeless state of the malady. Lesion of voluntary movements, as described above (§ 32), may, in rare cases, exist without insanity, but is generally consecutive upon, and an occasional complication of, disorder of the perceptions, or of the intellects, or of both the perceptions and intellects. This complication, moreover, merits the strictest attention in practice; for, where it exists, the perceptions and faculties are not merely simply perverted, but are, with the sensations, weakened, or even blunted. The memory is impaired; and association of ideas, whether true or false, is no longer vigorous. The affection of the intellects assumes an analogous state to the disorder of voluntary motion; the mental powers, as well as the muscles of volition, are universally weakened, and ultimately paralyzed.

42. It is evident that the proportion of cases in which the mental disorder is simple, and of those in which it is associated with lesions, either of sensation and perception, or of motion, or of both, must vary with the numerous circumstances connected with the predisposing and exciting causes, and with the duration and treatment of the malady; that the proportion of each class in lunatic establishments, especially, will vary with the regulations by which they are governed, and particularly with the restrictions as to the kind of cases admitted, the duration of the malady previous to admission, and the continuance of the patient under treatment. On this point, therefore, no precise information can be adduced. M. Foville, however, states, that in an institution containing 334 insane persons, of whom 144 were men and 190 women, he found 214, of whom 94 were men and 120 women, presenting intellectual disorder without complication; 89, of whom 34 were males and 55 females, manifesting various disorders of sensibility; and 31, of whom 22 were men and 9 women, labouring under general paralysis. According to this account, the number of cases of simple intellectual insanity is the most considerable; the proportion of cases associated with deranged sensibility and perception somewhat greater in females than in males; and the number of those complicated with general paralysis was much greater in men than in women.

43. II. Arrangement of Mental Disorders.—It is not more easy satisfactorily to arrange the disorders of mind than, in many instances, to determine the presence of disorder, and especially of that which is more strictly moral, the existence of which, if not always questioned, has been very generally overlooked until contended for by a few recent authors.

44. The ancients divided insanity into *Mania* and *Melancholia*. By mania they understood a general delirium, and by melancholia a partial delirium. This division has descended down to a recent period, receiving, from time to time, some modifications, which have not prevented its being still adopted by some modern writers.

45. M. Pinel arranged mental diseases into, 1st. *Mania*, which he defines a general delirium with agitation, irascibility, and a propensity to furor. 2d. *Melancholia*, or exclusive delirium, with debility, moroseness, and a propensity to despair. 3d. *Demency*, or a particular debility of the operations of the understanding, and of the acts of the will; and, 4th. *Idiotism*, or a sort of stupidity more or less marked, with a nullity of character, and a most limited circle of ideas.

46. Dr. Rush, in his excellent treatise on diseases of the mind, divided them into *partial* and *general*. He subdivided the *former* into, 1st. *Tristimania* (hypochondriasis and melancholia), in which a person entertains false ideas respecting his person, his affairs, and his condition, whereby he may be plunged in despair; and, 2d. *Amenomania*, in which the delirium is lively. The *latter* he subdivided into, 1st. *Mania*, or violent general delirium, with propensity to furor. 2d. *Manicula*, or a milder form of the preceding, or a chronic state of it. 3d. *Manalgia*, or a general torpor of the body and mind. 4th. *Dissociation*, or a state similar to the demency of Pinel; and, 5th. *Fatuity*, or a condition generally denominated idiotism by French nosographists.

47. M. Esquirol arranged mental disorders into, 1st. *Mania*, general delirium; and, 2d. *Monomania*, partial delirium. The term monomania conveys a clearer idea, and one more applicable to the diversity of cases of partial insanity than the word melancholia. He applies, with great propriety, the term *idiotism*, or idiotcy, to congenital abolition of the mental faculties, and that of *dementia*, or *demency*, to accidental loss of them. M. Georget, adopting the division of Esquirol, added a fifth species, consisting of acute dementia, described by the latter as a variety only.

48. Gall endeavoured to connect the states of partial insanity to the respective fundamental faculties into which he divided the manifestations of mind. His pupil, Spurzheim, while he kept in view the doctrines of his master, admitted four states of insanity, viz., idiotism, dementia, alienation, and irresistibility.

49. Dr. M. Burrows, extending the signification of the word insanity beyond most of his predecessors, has divided it into, 1st. *Delirium—delirium tremens*. 2d. *Mania—puerperal mania*. 3d. *Melancholia—suicide*. 4th. *Hypochondriasis*. 5th. *Demency*; and, 6th. *Idiotcy*. He observes, "that delirium and hypochondriasis have better claims to be considered as distinct species than mania and melancholia. It is true that, if delirium be received only in its ordinary acceptation, as symbolical of intellectual disorder, it does not merit the rank of a distinct malady. But I think that there is ground to consider it as a frequent idiopathic affection, though certainly much more generally as sympathetic, and often as symptomatic." On this topic it is unnecessary to offer any remarks, or to do more than to refer the reader to what I said when discussing the *diagnosis* of Delirium and Hypochondriasis.

50. Professor Heinroth has furnished a very elaborate arrangement of disorders of the mental faculties in his able work. He considers the derangements of the mind to be limited in number and in kind only by the diversities of the mental manifestations; and he bases his classification of these disorders upon two distinctions; the *first* is the difference which consciousness shows to exist in our mental op-

erations, or which exists between, 1st. The feelings or sentiments; 2d. The understanding or reasoning powers; and, 3d. The will. The emotions of joy, grief, pleasure; the processes of reflection and contemplation, and the acts of the will or of self-determination, are *three* kinds of mental phenomena, which he considers to be so clearly distinguished from each other as not to be confounded. According, therefore, as the cause of insanity is in relation to one or other of these kinds of mental manifestation, or as the disorder refers itself to either of these, or as it affects the feelings, the understanding, or the will, so it is placed in his classification, which consists of three classes of mental disorders, corresponding to these three departments of mental operation. The *second* distinction is derived from the character of the disturbance—whether it is that of exaltation or depression—of increased or diminished excitement or action.

51. Conformably with these bases of arrangement, the First Division consists of *disorders of passion, feelings, affections, and moral dispositions*, and presents *two forms*, viz., 1st. Of *exaltation*, or excessive intensity, giving rise to undue vehemence of feeling and morbid violence of the passions and emotions; and, 2dly. Of *depression*, or simple melancholy, or dejection without illusion of the understanding. The Second Division comprises *disorders of the understanding or intellectual faculties*, consisting of two forms, the first of which is characterized by *exaltation*, or undue intensity of the imagination, producing mental illusions, or the several varieties of monomania; the second, by *depression*, or feebleness of conception of ideas —by imbecility of the understanding. The Third Division consists of *disorders of the voluntary powers*, or of volition and the propensities, the first form of which is characterized by *violence* of will and of propensity, or madness without lesion of the understanding; the second, by *weakness* or incapacity of willing, or moral imbecility. To these unmixed forms, Dr. Heinroth adds, under each division, others displaying combinations of several simple varieties. Thus, exaltation of feeling and of imagination constitutes derangement of the understanding, with violent excitement or raving madness: delusion, with depression of feeling, constitutes insanity, with sorrowful dejection, or melancholy, &c.

52. M. Guislain, in his first able work on mental alienation, adopted, with very little change, the arrangement of Pinel. But in his more recent treatise, he has taken a more comprehensive and more original view of morbid mental affections, upon which he has bestowed the name *phrenopathies*, and which he has considered to proceed from an *exaltation*, or an *aberration*, or an *oppression*, or even from *exhaustion* of the cerebral energies. These are the *four pathological conditions*, which he views as the *efficients* of mental disorders; and he arranges them as follows, comprising, however, several affections not usually included among mental diseases, although sympathetically, or even more intimately deranging the manifestations of mind:

53. i. *Melancholia*, or *Luperophrenie* (from λυπηρὸς, sad, and φρὴν, the mind), which he defines to be an exaltation of the feelings and sentiments to a state of sadness, and which he considers to exist at the commencement of almost all cases, and, with lesion of the sensibility, to constitute the fundamental character of insanity, appearing as one of the more important features of the malady. It frequently, however, assumes a monomaniacal, or, as he more correctly terms it, *monopathic* form (from μόνος, single, and πάθος, disorder).

54. ii. *Mania*, or *Hyperphrenie* (from ὑπὲρ, above, and φρὴν), which he views as a state of cerebral reaction, in which the whole or some of the active manifestations of the intellect, or traits of the character, or propensities, &c., are remarkably exaggerated and disordered. This species of insanity presents two states: that of *erethism*, or tranquil mania; and that of *orgasm*, or furious mania. It may be partial—*monopathic*, or *monomaniacal*; or more or less general, as respects the extent to which the instinctive, intellectual, and moral powers are implicated. It may thus appear in the shape of ambitious, religious, lascivious, covetous mania, &c., assuming either a tranquil or a more or less furious character. The different forms of this species may be *associated* with *melancholia*, constituting *melancholic mania*.

55. iii. *Madness*, or *Paraphrenie* (from παρὰ, along with, and φρὴν), which he defines to be cerebral reaction characterized by fantastic aberration. This species presents numerous varieties and modifications as to the extent and association of mental disorder; but it is frequently partial or monopathic, and it may be either of a harmless or destructive nature. It is often *associated* with *melancholia*, or with *mania*, or with *both*.

56. iv. *Extasis*, or *Hyperplexie* (from ὑπὲρ, above, and πλῆξις, astonishment), which he views as sub-convulsive reaction of the cerebral power, characterized by immobility and rigidity. This state, although often monopathic, is also frequently complicated with *melancholia*, or with *mania*, or with *madness*, or with any two, or even all of these.

57. v. *Convulsions*, or *Hyperspasmie* (from ὑπὲρ, and σπασμὸς, violent contraction). This species M. Guislain defines to be reaction, with muscular and mental agitation. He comprises under it tremour, convulsive syncope, chorea, hysteria, and epilepsy, disorders previously not similarly classed, although either of them often *complicates* one or more of the mental disorders already enumerated, and even all of them in rare instances.

58. vi. *Delirium*, or *Ideosynchysie* (from ἰδέα, idea, and σύγχυσις, confusion), which he states to be reaction and aberration of the ideas, wandering of the intellects, illusions, hallucinations. This may be *monopathic*, as when the patient is possessed by a single idea or illusion; or it may be *associated* with one or more, or even with all of the mental affections just noticed.

59. vii. *Incoherence*, or *Rêvasserie*, or *Anacoluthie* (from ἀνακόλουθια, incoherence). This state M. Guislain considers as different from delirium, inasmuch as in the latter the ideas run upon some illusion or hallucination, whereas in this state they arise vaguely, and without any connexion with each other, or with any particular subject or object: nothing is expressed clearly or consecutively. In delirium,

the idea, although false, presents some connexion, or even the colours proper to it. Incoherence may be *monopathic* or *associated:* most frequently the latter; and the association may be with either of the preceding affections, or with several of them.

60. viii. *Dementia*, or *Noasthenie* (from νόος, intelligence, and ἀσθενία, debility). This state is viewed by M. Guislain as one of mental prostration and incapacity, in which the mental powers are palsied. This species is made to comprise those forms of insanity which consist of various grades of imbecility, original or acquired—congenital idiotcy and senile fatuity. Like the preceding species, it is either *monopathic* or *associated;* more frequently the latter, in which state it is usually the consequence of chronic or greatly prolonged forms of the disorders already enumerated.

61. I have thus fully adduced M. Guislain's arrangement of mental disorders, because it presents not merely a classification, but also an instructive analysis of them, especially when attentively considered in his own copious exposition. For practical purposes, and for the inexperienced practitioner, it will be found deficient in simplicity; but, coming as it does from one of the most experienced and ablest writers on mental alienation, it deserves our careful attention and our respect.

62. M. Foville, in attempting a physiological arrangement of mental disorders, observes, that *three orders* of phenomena, sensations, intellectual combinations, and movements, succeed one another in the actions of the nervous system; and that three orders of symptoms, exactly corresponding, show themselves singly or combined in mental diseases. In founding upon the existence of the symptoms of a single one of these orders, and upon the successive appearance of those of the other two orders, he hopes to have laid, not only a physiological, but also an anatomical basis of classification for the principal divisions of mental alienation, inasmuch as he thinks it may be admitted, at least with the consent of many modern writers, that sensibility, movement, and intelligence have each their distinct organic seat, although dependant upon the same system.

63. As *disorder of the intellects* is the most constant, the particular instances in which it is alone present constitutes M. Foville's *first division*, which comprehends mania, monomania, demency, and idiotcy, without complication with false perceptions, or with any disorder of the muscular system. In the *second division*, he arranges all cases characterized by the coincidence of disorder of sensation and perception with derangement of the intellects; and, in the *third division*, he comprises those which manifest that disorder of the muscular system, usually denominated general paralysis, or the palsy of the insane. In this third class he also comprehends the epileptic insane, as well as idiots, whose limbs are wasted and paralytic.

64. Dr. Prichard has distinguished insanity into, 1st. *Moral;* and, 2d. *Intellectual:* the latter he has divided into (*a*) *Monomania*, or partial insanity; (*b*) *Mania*, or raving madness; and (*c*) *Incoherence*, or dementia. *Idiotcy*, or mental deficiency, he has considered as entirely apart from, or unconnected with, any form of mental alienation.

65. Dr. Mayo, in his *Pathology of the Human Mind*, divides primary mental disease into, 1st. *Perversion*, or insanity; and, 2d. *Deficiency* of the mental manifestations. He subdivides *Perversion* of mind into, 1st. *Moral* incoherency; and, 2d. *Intellectual* incoherency: and *Deficiency* into, 1st. *Brutality*, or absence of the moral faculty; and, 2d. *Imbecility*, or intellectual deficiency.

66. I shall not notice at greater length the divisions of the various forms in which mental disorder presents itself that have been attempted by modern writers. Enough has been advanced to show the difficulty of the attempt, and to prove even (what many would endeavour to conceal) that one form of mental disorder gradually and insensibly passes into that more nearly allied to it, not only in distinct cases, but often also in the same individual; that, for instance, partial may rapidly pass into general insanity; that melancholia may quickly pass into mania, or mania rapidly lapse into melancholia, or that both may very frequently alternate; and that the more simple states of intellectual disorder may be soon associated with disorder of the sensations and perceptions, or be still farther complicated with lesion of the movements, in the form either of general palsy, or of epilepsy, or even of both. Nevertheless, although even the most different forms of insanity more closely approximate than is generally imagined, still it becomes necessary to preserve and to recognise such distinctions between them as really exist, inasmuch as they furnish most important indications for moral as well as for medical treatment. In the division, therefore, which I shall attempt, I shall endeavour, at the same time, to point out close relations as well as obvious distinctions; and to follow the progress of mental disorder from its more simple, partial, and common forms, up to its more general and complicated states. Conformably with this intention, I shall take a brief view, 1st, of the Partial Forms of Insanity—(*a*) as evinced chiefly in the *moral manifestations* of mind, and (*b*) as affecting principally the *understanding* or *judgment;* 2d, of the General Forms of Insanity—(*a*) in the state of *mania*, or raving madness; (*b*) in the states of *incoherence* and *imbecility*, or dementia; (*c*) in the state of *fatuity*, or annihilation of the powers of mind; 3d, of Complicated Insanity, the insanity being associated (*a*) with *paralysis*, (*b*) with *epilepsy*, (*c*) with *apoplexy*, &c. Connate and Puerile Insanity—*congenital privation of mind*, or *Idiotcy*, and *Puerile Imbecility;* Puerperal Insanity—*insanity during uterogestation, after parturition, and during lactation;* and Suicidal Insanity—*or suicide in relation to insanity*, will be considered in separate chapters of this article.*

* The following *classification* of the manifestations and affections of mind, with reference to their influence in causing mental and corporeal disorder, was published some years ago by the author. It may be found of use in considering the different forms of mental disorder, especially in relation to their arrangement, to their causation, and to their moral management. This classification of the affections of mind is based upon the relations of the human species to the rest of the animal creation, especially in respect of those manifestations which are exhibited by the higher animals. The *Instinctive Desires and Feelings* form the First Class, as being the most generally extended: and the *Intellectual States* and the *Moral Emotions* constitute the Second and Third Classes, as belonging especially to man, and as furnishing him with a numerous class of

67. III. OF THE SPECIAL FORMS OF INSANITY.—In the above general description, I have confined myself to the more obvious and fully developed states of mental disorder. It is necessary, however, that I should consider, in a more minute, yet succinct manner, the specific forms in which aberrations of mind present themselves in practice, and more particularly those slight, moral, and partial states of disorder to which I have as yet very imperfectly adverted.

68. i. PARTIAL INSANITY—*the simpler forms and slighter grades of mental disorder*.—Most authors have erred in viewing the more partial or *slighter forms* of insanity, as consisting of derangement of one, or of a few, merely, of the intellectual or moral manifestations; or of a false perception, or delusion, by which the mind is constantly haunted, while the other faculties are unimpaired. I have already hinted (§ 3) at the inaccuracy of this view, and stated that, although a single faculty or manifestation may be prominently disordered, or a single train of ideas be almost exclusively entertained, the other mental faculties are never in a healthy state, or very rarely retain their former energy. Conformably with this, the term *partial insanity* is not so applicable to the states of disorder about to be considered, as one which would imply a *slighter grade*, or a *simpler form*, of alienation. But as the former has been already employed by recent authors, and as it may be conveniently used as implying slightness of grade, as well as an uncertain limitation as to extent, I shall retain it, and employ it synonymously with these expressions.

69. *A*. MORAL INSANITY—the *Monomanie sans Délire*, or *M. instinctive*, of M. ESQUIROL.—This state of mental disorder may be *defined* to be *a perversion of the natural feelings, affections, in-*

---

ideas, which raise him above all other animals, which enable him in his social and moral relations, and which enable him to derive advantages from the past to rationally enjoy the present, and to form the liveliest hopes, and even the firmest anticipations, of the future.

CLASS I. INSTINCTIVE DESIRES AND FEELINGS.—Strong and immediate incentives to action in the lower animals, but controlled by reason in man.

ORDER 1. *Instinctive Feelings, tending to preserve the Individual.*

a. The *sensations* derived through the medium of the external senses contribute to the preservation of the individual, by showing him what is injurious, and by enabling him to supply himself with what his internal sensations or appetites indicate to be necessary to his existence.—*b*. The appetite for food and drink.—*c*. The desire of preserving the animal warmth.—*d*. The desire of repose.—*e*. The desire of place.—*f*. The desire of pleasure and the dread of pain.—*g*. The desire of continued existence.

ORDER 2. *Instinctive Desires tending to perpetuate the Species.*

a. Parental and filial affection.—*b*. The desires of sex.—*c*. Desire of society and social feelings, giving rise to mutual support.

The *sensations* and *desires* are most powerful incentives of volition. The appeasing of the *desires* is necessary, not only to health, but even to existence. The inordinate gratification of them is most injurious to physical and mental health—is among the most fruitful sources of disorder of both mind and body.

CLASS II. INTELLECTUAL POWERS, OR STATES OF MIND.

ORDER 1. *Powers of Consciousness, or the simple Intellectual States of Mind.*—Injurious to health, chiefly from their injudicious or excessive exercise.

a. Perception.—*b*. Attention—effects of protracted, to a single object, or train of investigation.—*c*. Conception—accurate or inaccurate views—their effects.—*d*. Memory. This last power is more or less concerned in a large proportion of the states of mind affecting the health.

ORDER 2. *Powers of Intellection, or the more active Intellectual States of Mind.*—The excessive exercise or misdirection of these is more or less injurious to mental and bodily health.

a. Simple suggestion or association of ideas.—*b*. Habit.—*c*. Imagination—its activity as influenced by the moral emotions of mind, sometimes beneficial, but oftener injurious to health.—*d*. Judgment, or reasoning.—*e*. Abstraction.

ORDER 3. *Ideas of Reflection, springing from the Exercise of the two former Orders of Powers.*—Rational incentives to action.

a. Mental identity.—*b*. Time.—*c*. Power.—*d*. Causation and truth.—*e*. Right and wrong.—*f*. Existence of a Deity.—*g*. Immortality of the soul. All these are seldom injurious to health, but are often beneficial in controlling the emotions and desires, in governing and directing the instinctive feelings, and in enabling the mind and body to resist the influence of injurious impressions and agents.

CLASS III. MORAL AFFECTIONS OF MIND, *in which some of our Instinctive Feelings, as well as of our Intellectual Powers, are frequently more or less engaged.*

ORDER 1. *The Instinctive, or simple Moral Emotions of Mind*, often sudden and violent incentives to action. When strongly excited or much indulged, they are among the most influential causes of both mental and corporeal disease.

a. Anger, indignation, resentment, revenge—their effects upon health.—*b*. Sympathy—its effects.—*c*. Beauty, or deformity.—*d*. Love and hate, jealousy, domestic misery.—*e*. Pride, vanity, and humility—the liability of the former to lead to insanity.—*f*. Gladness, regret, sadness, and grief. Grief from lost objects of affection—its effects—counteracted by progeny. Grief from moral degradation the least supportable—why? Effects of sudden shocks of grief on sensitive minds. Disappointments of the affections. Grief from loss of fortune, &c. Influence of repeated disappointment and losses—of harassing difficulties.—*g*. Hope and fear—their effects on health. Confidence. Various anticipations—their effects. Anxiety; that of professions, particularly of medicine. Anticipated happiness—effects of the sudden arrest of, on sensitive minds, &c. Terror, fright, &c.—often productive of nervous diseases, and sometimes of mental disorder.—*h*. Gratitude.—*i*. Wonder. Desire of Novelty. Mental languor.—*k*. Sublimity and ludicrousness.—*l*. Love of approbation.—*m*. Desire of power and its related affections. Desire of knowledge. Fame. Avarice.

ORDER 2. *Rational Emotions of Mind, arising out of moral and religious Obligations*, often strong incentives to action.

a. Rectitude, virtue, merit, and demerit, with all the duties we owe ourselves, as moral and responsible agents, and as tending to promote our intellectual and moral excellence and happiness.—*b*. Our various duties as members of society.—*c*. Our religious obligations as immortal beings. Remorse, or the consciousness of having neglected one or more of the above duties and obligations—sometimes productive of disorders of mind and body.

---

i. The influence of mental culture—intellectual and moral—when duly directed in early life, upon the temperament and constitution—upon mental and bodily health—in developing and in strengthening both the mind and body.

ii. Temperament and constitution remarkably modify the operation of the affections of mind upon health. Illustrations.

iii. The influence of mental and bodily occupations—1st. Upon mind; 2d. Upon the body.

iv. Ill effects of want of occupation—Ennui—Hysteria—Hypochondriasis—Melancholy—Insanity—Suicide. Effects of solitary confinement.

v. Bad consequences of improper occupations and amusements, especially in females in early life. Mental dissipation—its effects, particularly in impairing, 1st. Mental vigour; 2d. Bodily health.

vi. Consequences of habitual amusements, sensual indulgences, and pleasurable excitements, on the nervous system. These generate feelings calling for their repeated gratification, and for increased excitement, until nervous energy and vital power are exhausted, and until moral and physical ruin ensues.

vii. Good effects of a well-regulated and cheerful mind on health—of agreeable pursuits, particularly those exercising both the mind and the body. The influence of confidence—of moderation—of contentment—and of agreeable and useful occupations, in securing both the health and happiness of their possessors.

clinations, temper, habits, moral dispositions or impulses, without any illusion or hallucination, the intellectual faculties being more or less weakened or impaired. This state has been noticed by HEINROTH and GUISLAIN, and more fully by Dr. MAYO, M. ESQUIROL, and Dr. PRICHARD, in their recent works. Its earlier or slighter grades, however, have not generally been viewed as amounting to insanity; and, indeed, unless either the disordered manifestations, which I have just enumerated as constituting it, be remarkably prominent, or the intellectual faculties be much weakened or impaired, it cannot really be considered as amounting to mental derangement. Dr. MAYO has noticed, in his *Essay on the Relation of the Theory of Morals to Insanity*, a certain variety of it as belonging to insanity, and given it the name of *Brutality*; but in a more recent work he remarks, that farther consideration has satisfied him that to class it as such is loose and unphilosophical. He considers this as a distinct form of mental disease, especially in its fully-developed or strongly-marked form, and to be altogether distinct from the moral symptoms of insanity that occur at an early period of the disease, and that often afford, at that time, the only clew to its existence. By *Brutality*—by the moral disposition to which this term may be applied—he implies a destitution of principle; by *Insanity*, a perversion of tendencies and want of self-control. In the latter case, the patient cannot hear the voice of conscience; in the former, he has no conscience to hear.

70. The moral disorder, termed brutality by Dr. MAYO, is, however, only one of the modifications of moral insanity, comprised in the more extended definition which I have attempted to assign to this species of mental derangement, agreeably with the observations of HEINROTH, GEISLAIN, and PRICHARD, and is one arising chiefly from the unrestrained indulgence of the passions and appetites To it, however, I shall more fully advert in the sequel. In respect of moral insanity, in its more extended signification, it is justly remarked by Dr. PRICHARD, that there are many persons living at large who are affected, more or less, with this modification of mental disorder, and yet are reputed to be merely of a singular or wayward character. An attentive observer will often recognise something remarkable in their manners and habits leading to doubts of their entire sanity; and circumstances often appear which strengthen the suspicion. An hereditary tendency to madness may have existed in the family, or various members of it have been subject to diseases of the brain. The individual himself may have been the subject of an acute attack of insanity, or of inflammation of the brain, in a former period of his life; and from that time, or after having sustained some reverse of fortune, or the loss of a beloved relative, his temper and dispositions have undergone a change. This alteration of character may likewise have followed some dangerous illness or severe shock of constitution, especially fever, phrenitis, paralysis, apoplexy, or epilepsy. In some, the alteration in the temper, in the passions, the habits, or the disposition, may have been gradual or imperceptible; in others, sudden, or almost immediate upon its determining cause. In either case, it seems to have consisted chiefly of an exaltation of peculiarities or dispositions, more or less natural or habitual to the individual. In this state a person may continue for years, following the bent of his perverse inclinations; always engaging in new pursuits, and soon relinquishing them, without any sufficient object or inducement excepting caprice. At length the total perversion of his affections and dislike, or even enmity to his dearest friends, excites alarm.

71. *a.* When the head of a family is affected with this ambiguous modification of insanity, it often becomes necessary, to prevent ruin from absurd extravagance or wild projects and speculations, to make some attempt at taking the management of his affairs out of his own hands; but for this the laws are inadequate, and the endeavour is often unsuccessful. Persons labouring under this disorder are capable of reasoning upon any subject within the sphere of their knowledge, and often display great ingenuity in giving reasons for their conduct, or in justifying their moral feelings. In these cases, as well as in others belonging to other modifications of this species of insanity, the feelings and passions are more or less excited, while the controlling faculties of reason and judgment—of attention and comparison—are equally weakened, errors in action and conduct resulting therefrom.

72. Moral insanity is not, however, limited to a preternatural excitement of the passions and temper, but comprises many other disordered states of the mind. Indeed, its varieties are almost as numerous as the modifications of disposition and temper. The most frequent forms are characterized, either by the kind of excitement just noticed, or by melancholy dejection. Either of these forms of moral disorder may continue more or less permanently; but they sometimes alternate or supersede each other, an opposite state of temper or feeling arising without any obvious cause. The prevalent character of the affection is occasionally derived from the natural disposition of the individual; but it is often remarkably different—lively persons becoming dejected; and the melancholy or taciturn, lively, loquacious, or sanguine.

73. *b.* When *sorrow* or *gloom* is natural to an individual, and is not excessive, it does not amount to disorder; but, when it is remarkable and constant, without any real cause, it becomes a moral disease, although entirely devoid of any illusion or hallucination. Dr. PRICHARD remarks, that this tendency to morbid sorrow and melancholy, as it does not destroy the understanding, is often subject to control when it first arises, and probably receives a peculiar character from the previous mental state of the individual, from his education, and his religious or irreligious character. Persons of well-regulated minds, when thus affected, express grief and distress at their conscious inaptitude to the active duties of life; and often feel a horror of being driven to commit suicide, or some dreadful crime to which they feel various obscure impulses or tendencies. This idea haunts them, and renders them fearful of being a moment alone. It, however, generally subsides, and a healthy state of mind returns. Persons of an opposite character frequently relapse into a state of *tædium vitæ*, or of morose disgust;

loathe their very existence, and at length attempt to end it. A state of gloom and melancholy may, however, give way to a state of morbid excitement.

74. *c.* When the moral disorder is one of *unnatural excitement*, the person affected is full of projects and enterprises, or is active and boisterous beyond the limit that belongs to a naturally lively disposition. This state of disorder may occur in persons whose temperament is the reverse of either the sanguine or lively; and it then becomes the more striking. It usually displays itself in a want of self-government, in continual excitement, an unusual expression of strong feelings, in thoughtless and extravagant conduct. A modest female becomes violent and abrupt in her manners, loquacious, impetuous, talks loudly and abusively of her friends or relations before entire strangers; or uses indecent expressions, and betrays, without reserve, unbecoming feelings and trains of thought. Persons thus affected often become drunkards; and a debauch is followed by raving madness, requiring restraint or confinement, which, with abstinence, removes for a time the maniacal excitement; but as soon as restraint is withdrawn, they resort to their former excesses, although well aware of the consequences. This form of the disease I have met with in two instances in professional men.

75. *d.* In examples of a different description, as Dr. PRICHARD remarks, the mental excitement constituting the disorder is connected with *religious feelings*, especially when the period of excitement has been preceded by one of melancholy, during which the person affected has laboured under depression and gloom, mixed with apprehensions as to his religious or future state. Formerly possessed by a dominant sense of condemnation and abandonment, when all hope and comfort have vanished, and nothing has mitigated the gloom and sorrow of the present, or allayed the dark and fearful anticipations of the future, his feelings become suddenly changed, and he experiences a lively joy in his contemplations, amounting often to rapture and ecstasy. Such a change is hailed by the devout as a happy transition from religious destitution to divine acceptance and grace. But the train of excitement is too high, the expressions of happiness too ecstatic to be long mistaken; pride and haughtiness, a violent or boisterous deportment, and selfishness, are soon betrayed, with want of natural affection, variability of spirits, and irregularity of mental habits and of conduct. In these cases, there is no false sensation or perception impressed upon the understanding; no illusion or belief of a particular sentence of condemnation, or message of acceptance, specifically revealed. If this existed, the case would be one in which the moral disorder is only the consequence of a false perception or delusion, and consequently one which belongs to another species of mental disease.

76. *e.* Particular cases are marked, as noticed by PINEL, ESQUIROL, HOLLAND, and PRICHARD, by the prevalence of *certain passions* and *mental habits*, displayed under modifications of which the human mind, in a sane state, seems hardly to be susceptible. Among these is an unusual prevalence of angry and malicious feelings, arising without provocation or ordinary excitement, constituting what PINEL designates "*Manie sans Délire.*" There are many instances, observes Dr. PRICHARD, in which the whole diseased manifestation has consisted in a liability to violent fits of anger without cause, and leading to danger, or actual commission of serious injury to surrounding persons. The characteristic feature of this malady is extreme irascibility, depending on a physical morbid cause. There are other instances in which malignity has a deeper dye. The individual is continually indulging enmity and plotting mischief, and even murder, against some object of his malice. When this is connected with the false belief of some personal injury actually sustained, the case does not fall under the head of moral insanity. It involves hallucination or erroneous conviction of the understanding; but when the morbid phenomena include merely the expressions of intense malevolence without provocation, actual or supposed, the case is strictly one of moral insanity.

77. *f.* In some instances, the *impulses* and *propensities* to which the patient is subject, or which he has indulged, are so exalted or disordered as to constitute the sole manifestations of insanity, as ably insisted upon by REIL, HOFFBAUER, and PRICHARD. A sudden impulse to commit an atrocious act may arise in the mind of a person otherwise apparently sane, and in possession of his intellectual faculties, and be resisted by reason and self-control, on each of many occasions of its successive occurrence. At last the patient either may doubt his own powers of control, solicit the interference of his friends, and submit himself to restraint; or he may, at last, be unable to resist the impulse. In other cases, crimes have been perpetrated without any fixed object or motive, and the punishment of the law has overtaken the victim of disease. Insane persons may display their states of mental disorder by a propensity to commit every species of mischief, although devoid of any feeling of malevolence. A propensity to theft is frequently a feature, and often the characteristic one, of moral insanity. In some, it may be nothing more than eccentricity of character, as Dr. PRICHARD supposes, but it is more commonly associated with other manifestations of mental disorder, when actually amounting to moral insanity, and it is to be viewed in connexion with the individual's position in society, with his previous habits and character, and with the existence or non-existence of mental derangement in any member of his family.

78. *g. Moral Insanity*—the *Manie raisonnante* of PINEL—the *Monomanie raisonnante* of ESQUIROL—is often manifested, especially, by the singular, absurd, and exceptionable nature of the actions, intentions, and propositions of those affected by it. Persons thus disordered are turbulent, unsociable, and engaged constantly in affairs which are blameable, ridiculous, and contrary to their former habits, to their real interests, and to the interests of their families. Their moral character is altogether perverted, and they become dangerous chiefly to themselves and to those depending upon them, owing rather to the consequences, than to the nature of the actions which they commit. Although engaged or entering upon what compromises their interests and character, or

abandoning the objects of their affection, or quitting their families or affairs, they argue strongly in support of their conduct. While there is a change or total perversion of the habits and affections, there is also sufficient power of intellect to attempt a justification of the sentiments and actions they have espoused.

79. *h.* Moral insanity has been viewed by M. Esquirol as presenting either an *acute* or a *chronic* course; and he believes that it may be divided into *three stages:* in the *first*, the character and habits are changed; in the *second*, the affections are perverted; and, in the *third*, maniacal excitement, or violence of the temper or passions, with degradation of the faculties, more or less rapidly ensue. It may assume a remittent or intermittent course; and after recovery from it, relapses are very frequent. If uncontrolled, it often passes into, or becomes complicated with one or other, or even with more than one, of the other forms of insanity about to be distinguished, and even also with palsy.

80. *i.* The variety of insanity termed *Senile Insanity* by Dr. Burrows, as occurring in old age, often assumes the form of moral insanity, but more frequently that of general imbecility. In the former case, it consists in a morbid excitement of the passions, and a remarkable perversion of the temper and propensities—in a change in the whole moral character, without any hallucination or false perception, the existence of which would constitute it a different species of mental disorder.

81. A variety of instances, as Dr. Prichard observes, is mentioned by writers, in which the unusual intensity of particular passions or emotions has been thought to constitute mental disease, and compound epithets have been applied to these states of the mind and its affections. *Nostalgia* and *erotomania* have been considered as disorders of sentiment; *satyriasis* and *nymphomania*, of the physical feelings. The excessive intensity of any passion is disorder in a moral sense. It may depend, physically, upon certain states of the constitution; but this does not so clearly constitute madness as the irregular and perverted manifestation of desires and aversions. This form of insanity has undoubtedly been the source of moral phenomena of an anomalous and unusual kind, and of certain perversions of natural inclination, which excite the greatest disgust and abhorrence. Besides these, however, there are others, to which I may also more particularly advert, and which are noticed by M. Esquirol as constituting forms of monomania, under the designation of *Monomanie d'Ivresse*, of *M. incendiaire*, and of *M. homicide*. There may be doubts of the propriety of considering these, or even *erotomania*, as forms of insanity. But it is difficult, in respect of the mental manifestations, as well as of the bodily functions, to draw the line of demarcation between health and disorder; and there can be no doubt that the excessive excitement of any particular passion, sentiment, or emotion, or the undue predominance of it for an unusually long period, or the uncontrollable impulse or desire to appease or to gratify any appetite, amounts to moral disorder, which becomes the more manifest and indisputable, as it is the more freely indulged. As long as reason restrains the appetites, passions, and emotions within the conventional limits prescribed in society, and is competent to the decided exercise of this sway, moral disorder cannot be said to exist; but when it loses this salutary influence, and in proportion as it is incompetent to exert such influence, either from the violence of passion, or the weakness of the understanding, the mental disorder is the more evident.

82. *a. Erotomania—Monomanie érotique* of Esquirol—is *characterized by an excessive love of some object, real or imaginary.*—It is a mental affection in which amorous ideas are as fixed and dominant, as religious ideas are in religious monomania or melancholia. Erotomania is very different from satyriasis and nymphomania. In the latter, the mischief is in the reproductive organs; in the former, it is in the mind. The one is a physical, the other a moral disorder. Erotomania is the result of an excited imagination, unrestrained by the powers of the understanding; satyriasis and nymphomania proceed from the local irritation of the sexual organs, reacting upon the brain, and exciting the passions beyond the restraints of reason. In the former, there is neither indecency nor the want of chastity; in the latter, there is unrestrained expressions of sexual desire and excitement. The one is commonly caused by ungratified or disappointed affection excited in a virtuous mind; the other, by inordinate irritation or indulgence of the sexual passion.

83. In erotomania, the eyes are bright, the manner and expressions tender and passionate, and the actions free, without passing the limits of decency. Self and selfish interests are all forgotten in the devotion paid, often in secret, to the objects of the mind's adoration. A state of ecstasy often occurs in the contemplation of the perfections which the imagination attaches to the subject of its admiration. The bodily functions languish during this state of moral disorder; the countenance becomes pale and depressed; the features shrunk; the body emaciated; the temper inquiet and irritable; and the mind agitated and despairing. The ideas continually revert to the loved and desired object; and opposition, or endeavours to turn them in a different direction, only render them more concentrated and determined in their devotion. At last, parents and fortune are abandoned, social ties broken asunder, and the most painful difficulties are encountered in order to obtain the object of admiration.

84. In some cases, the attempts made by the patient to conceal and to overcome this affection occasion a state of irritative fever, with sadness, depression, loss of appetite, emaciation, &c., which has not inappropriately been termed by Lorry *Erotic Fever*, and which, after continuing an indeterminate period, may even terminate fatally. When a young person becomes sad, absent in mind, pale and emaciated, sighs frequently, sheds tears without any obvious reason, is incapable of mental or bodily exertion, scarcely speaks to any one, loses appetite, &c., it is sufficiently evident that the mind is inordinately possessed by some desired object. If a strong effort be not made to dispossess it of the predominant sentiment, or if the object of desire be not obtained, the symtoms become still more distressing. The corporeal functions languish, the eyes sink, the

pulse becomes weak and irregular, and the nights disturbed and sleepless. At last a form of slow hectic is produced; and the weaker organs, especially the lungs and heart, are the seat of slowly-produced disease; the whole frame is blighted, and the patient sinks from the injurious influence of the mental affection on the vital organs.

85. This form of moral disorder may increase, and affect the intellects in a much more serious manner, until general insanity or mania is developed; and, with the progress of time, it may at last terminate in dementia or incoherent insanity. In each of these, the primary character of the disorder, or the original moral affection, will still continue to be manifested by the frequent suggestion of the same train of ideas, or recurrence to the object of devotion.

86. *β. The irresistible propensity to intoxication —Monomanie d'Ivresse* of M. Esquirol—may be viewed as actually constituting a variety of moral insanity, and, indeed, has been thus considered by the able and experienced writer just named. There can be no doubt of early advances of partial as well as of general insanity being sometimes indicated by an irresistible impulse to indulge in intoxicating liquors. And this impulse may be connected with a physical or corporeal feeling, rendering it still more irresistible, especially to persons of weak character. In many cases, indeed, the insanity is not so much caused by the intoxication, to which it is so frequently imputed, as the impulse to indulge it is a symptom of the incipient mental disorder. This is especially the case when a person, previously temperate, suddenly addicts himself to the use of intoxicating liquors, and particularly of ardent spirits. Sometimes, at the commencement of insanity, the state of the stomach, and even of the whole vital organs, is such as to be attended by an irresistible craving for stimulating fluids—by a kind of *pica*. This craving and the mental impulse accompanying it are generally suddenly developed; and occasionally, after having been appeased and gratified, they do not again return until after some time. Moreover, at this period of the mental disorder, the moral powers are weakened, and the mind altogether enfeebled and incapable of sufficiently resisting the morbid impulse, which is usually also attended by ennui, irritability, painful sense of sinking at the epigastrium, and restlessness. The desire to appease this instinctive craving is, at last, imperative. When gratified, the patient becomes violent, maniacal, and dangerous to himself and to those around him. He continues to swallow the intoxicating fluids as long as he can procure them, or as long as he has the power of doing so, until the paroxysm terminates. As the patient becomes sober, the maniacal turbulence often subsides, but it frequently continues for some time afterward, often for many days, with signs of more or less vascular excitement of the brain and its membranes; and, in many cases, when he can revert to the means of intoxication as he becomes partially sober, the insane violence is very considerably prolonged. At last the paroxysm terminates, and the craving for exciting liquors is no longer felt. Instances have even occurred of these liquors being afterward loathed, until another paroxysm took place. M. Esquirol met with a case of mania consequent upon intoxication, which was followed by a distaste of all fermented and distilled liquors for ten years afterward. Some persons, unable to withstand the impulse to intoxication occasioning fits of insanity, have solicited the restraint of friends; and others have committed suicide when they found themselves unable to resist the morbid impulse.

87. This state of moral disorder, while it gives rise to fits of maniacal excitement, often also occasions more permanent mania, and even dementia. The maniacal paroxysms, when thus excited in females, are frequently associated with hysterical symptoms; and when mania or dementia is consequent upon it, palsy is not an infrequent complication.

88. *γ. Incendiarism is sometimes an act of partial insanity—Monomanie incendiaire* of Esquirol *—Pyromanie* of Marc. (*Ann. d'Hygiène*, t. x. Paris, 1838).—It is, however, more generally one only of the modes in which an evil or mischievous propensity manifests itself, when excited by envy, jealousy, or revenge, in the minds of persons unrestrained by reason and by the laws. Yet instances are recorded by Henke, Esquirol, Marc, and others, of persons being impelled to the commission of this act by an irresistible impulse, which their will was incapable of overcoming. Most of these cases have occurred in girls and young women, who were either pregnant, or disordered in the uterine functions. Several of them presented signs of increased determination of blood to the brain; and some manifested other signs of insanity, either with or without illusions or false perceptions. M. Esquirol concludes, from the history of cases of this kind, observed in France and Germany, 1st. That mental alienation, whatever may be the character of the delirium, determines some insane persons to commit incendiarism; and, 2dly. That there is a variety of monomania without delirium (without hallucination) characterized by an instinctive impression—an uncontrollable impulse—to commit this crime.

89. *δ. Homicidal Insanity—Monomanie homicide*, Esquirol *—Fureur maniaque*, Fodéré—*Manie sans Délire*, Pinel.—Murder, or attempts to murder, are made by insane persons, 1st. When impelled by an involuntary impulse, or instinctive desire, which they are unable to resist; 2dly. When actuated by motives on which they are capable of reasoning, and while conscious of the evil they have committed; 3dly. When influenced by illusions, hallucinations, or false perceptions; 4thly. When excited by passion or opposition; 5thly. When they believe that they are opposing an enemy, against whom they should defend themselves; and, 6thly. When the intelligence is so prostrate as to be incapable of distinguishing right and wrong, and when they act from imitation. It is respecting the *first* and *second* of these—the former especially—that I now proceed to offer a few remarks.

90. Persons who appear to enjoy reason, but whose active moral powers—whose affective functions of mind, in the language of French pathologists—are disordered, must, conformably with what I have advanced, be viewed as insane. These persons perceive, compare, reason, and judge correctly of matters, but they

are influenced by the least cause, or even without any object, to acts of violence. They are irresistibly or instinctively impelled, with a full consciousness of their state, to commit the crime they most hate. They deplore their situation, and give warning to guard against their fury, or to deprive them of the power of committing the dreaded act.

91. But the question has been long since and often proposed, Is there really a form of insanity in which a person may enjoy reason unimpaired, and yet commit the greatest of crimes? M. ESQUIROL formerly answered this in the negative; and stated, that of the partially insane, who appear to enjoy their reason, and to deplore the determinations by which they are so strongly impelled, all admit that they have felt something internally or mentally at this time, of which they could give no clear account; that their brains were embarrassed; that they experienced more or less difficulty—often an inexpressible difficulty—in the exercise of their judgment; and that this was preceded by physical symptoms which they perfectly recollected. One felt a burning heat or a pulsation in the head; another, a lacerating, or a sharp, or acute sensation rising from the abdomen to the interior of the cranium; a third, a momentary illusion or hallucination; or a fourth was betrayed by an erroneous process of reasoning. One person suddenly becomes red in the face, imagines he hears a voice addressing him, and acts according to the injunction he believes imposed on him, or to the call addressed to him. A husband is persuaded that his wife is unfaithful to him; and, although every circumstance is considered by him, and found to militate against the truth of the persuasion, yet, in a moment when the jealous feeling gains the ascendency, an act of murder is committed. The mother of a family believes that her situation is distressing, and that her children will be reduced to mendicity. In a fit of despair she forms the resolution of destroying them, in order to preserve them from a calamity which she considers greater than death; but in the moment of her attempting it, maternal tenderness, speaking louder than despair, exclaims, "Protect my children from me!"

92. All these instances may be referred to a momentary delusion or hallucination, under the influence of which crimes or insane actions may be committed, after which a lucid period occurs. But there are other instances which cannot be thus explained, and which do not altogether warrant the conclusion at which M. ESQUIROL arrived in his earlier work; and of this he is aware in his more recent production, for he there admits that, although partially insane persons are often betrayed by their delirium or their hallucinations into the commission of homicide, yet there are others who commit the crime from an instinctive or irresistible impulse. In the former class of insane homicides, the understanding is disordered, under the influence of false perception, or of a delusion momentarily entertained, and the insane person acts under an error of judgment; but, in the latter class, reasoning and judgment are altogether suspended, and the insane impulse impels and directs the will, without any effort of the understanding or of the moral powers to prevent the act. An individual thus affected acts uninfluenced by delirium, or delusion, or emotion, or passion, and almost without consciousness, impelled by an instantaneous, blind impulse, independent of the will, and before which reason and judgment are for a moment entirely prostrate. This constitutes the paroxysm of monomania without delirium of the French writers. Of this affection I have met with three instances. In two of these, however, there was more or less disorder of the digestive organs; and in the third, a female, the catamenia were disordered; but there was no other indication besides this of mental alienation. This subject is most important, and is, moreover, very intimately related to *suicide*, inasmuch as the morbid impulse to destroy one's self is similarly manifested, as will be shown in the sequel, and much more frequently than the impulse to destroy another. Yet has it been nearly overlooked by most writers, and especially by those of this country, notwithstanding the growing increase of both crimes, and the evidence furnished, by a careful inquiry into their remote causes, of a progressive increase of them being likely to result. Homicidal monomania most frequently occurs in persons of a sombre, melancholic, or capricious disposition; but it is also met with in those who are remarkable for the amiability of their tempers and manners. The state of the atmosphere, disorder of the digestive and excreting organs, excitement of the nervous system, a vicious education, the reading improper books, and accounts of crimes, suicides, &c., unsound and exalted religious sentiments, the influence of imitation, chagrin and disappointment, want, &c., are chiefly concerned in developing this moral distemper. A very few instances from among many will illustrate this state.

93. The mother of four children was suddenly seized with the desire of killing them, and flew from her house as the only way of preventing the commission of the act. A maid, on each occasion of her dressing the infant committed to her care, was seized with an uncontrollable desire to murder it. A man experienced repeated impulses to murder his wife, to whom he was warmly attached, and was prevented on one occasion from attempting it by an accidental occurrence. He applied to the author for advice, and to be placed under restraint. He was at that time apparently well, and capable of pursuing his usual avocations. A person, after reading the horrible details of a murder, which was circumstantially narrated by the daily and weekly caterers to the most depraved passions of the multitude, was suddenly seized with an impulse to kill his wife. It has been observed in France, in Germany, and in England, that the publicity given to the particulars connected with a murder has been followed, within a few days, by several attempts to commit this crime.

94. Although various moral causes combine, in some cases, to predispose the mind to be influenced by the insane impulse to perpetrate this and other crimes, yet it will be found, in most, if not in all instances, that the person thus *morally* affected is also *physically* disordered, if the examination be made with sufficient care, and with the requisite knowledge of the several manifestations of gradual and insidious disease of the brain and of the abdom-

inal organs. A most attentive examination of the various functions of the brain and of the senses connected with it—of the temperature and circulation of the head—of the functions of those viscera which most readily sympathize with the brain, and which so powerfully influence both its actions and its circulation, and even of the appearances of the tongue, and of the several excretions, will generally disclose more or less disorder in one or more of these quarters, and prove, that although there may not be very obvious disease, there is lurking mischief, either primarily or consecutively, but always most seriously affecting the brain. In the slighter and more incipient states of morbid action in this organ, the general and local sensibility and the circulation often betray little or no disturbance, and, indeed, the whole amount of physical disorder may be so small as to escape the detection of all, excepting the closest observer, who, from experience, will look for it and detect it more readily in the sympathies and in the symptomatic affections of remote parts than in disorders of more closely related organs. It is reasonable to infer, that when capillary action in the brain is slightly but very generally disordered, and especially when this disorder commences gradually, and almost imperceptibly, and proceeds slowly and insidiously, those manifestations of mind which are of the highest order in the scale of mental development will be the earliest and most seriously deranged; and that, as the physical disorder proceeds or extends, the other orders of mental operation—the *intellectual* and the instinctive (see *Classification* at § 66) —will become successively implicated, until the various phases of moral and intellectual insanity are passed through, and instinctive insanity or fatuity is ultimately reached.*

95. *B.* Partial Disorder of the Understanding—*Amenomania* of Rush—*Monomania* of Esquirol—*is characterized by false perceptions, illusions, or erroneous convictions referring to one or a few subjects merely, or involving chiefly a single train of ideas, and so impressing the mind as to partially disorder the judgment.* Partial insanity of the understanding may exist, 1st. *In a more or less simple form*; or, 2dly. *Associated, or complicated with moral insanity.* Indeed, most of the instances in which crimes are committed in the insane state present this latter form. Even the more simple states of monomania of the understanding may be said to be insanity with reference to a small number of subjects, rather than to one subject only, since the number of persons who are insane upon a single subject merely is comparatively few. Most of the cases usually denominated monomaniacal are those which present some predominant idea or hallucination, amid other indications of mental weakness or disorder, as I have already contended (§ 68).

96. This species of insanity was distinguished by the term *melancholia*, from the age of Hippocrates, till M. Esquirol imposed upon it the name of *monomania*. As the former expression suggested the idea that partial derangement of the understanding is essentially connected with sadness and despondency, and as this is not the case, the latter term is much less exceptionable, although not always strictly applicable, for the reason just assigned. The expression, therefore, which I have made use of at the commencement of this section is more applicable to the different states of this species of derangement than any single word that can be employed. Although the illusions which possess the minds of persons partially insane are as varied as the operations of the intellect, yet they very frequently are productive of either happiness or distress to the patient. Hence they admit of being divided into those which are pleasurable or exciting, and those which are gloomy or depressing: a division, indeed, which has been adopted by Rush and Esquirol. Still there are some predominant ideas which do not necessarily produce either happiness or misery, but which may be contingently associated with either, or with each alternately. Indeed, many persons become insane upon some metaphysical or abstract subject, on which they talk absurdly, but without any disposition to grief or to elevation of mind. It should also be remarked, that M. Esquirol has comprised under monomania those states of moral disorder already noticed, and which have been excluded by Dr. Prichard, under the belief that they are unconnected with any illusion or hallucination. But, as I have already contended, the judgment is more or less impaired in these states of moral disorder, although not to such an extent or in such a way as to give rise to a precise morbid perception, or perversion of the understanding, and self-control is remarkably weakened.

97. The forms of partial insanity of the understanding have been distributed into many orders or kinds. The subdivisions would be endless if it extended to as many different kinds as there are modes or varieties of hallucination; at most, a division can be founded upon the prevailing passions or emotions, which give origin, and impart their peculiar character to the disorder; but even this would be too extended. It might, therefore, be sufficient to arrange them into, 1st. Those characterized by exaltation or excitement; and, 2dly. Those evincing more or less depression. This arrangement, however, would exclude more than one of the varieties of mental disorder which fall under the present head, or of those hallucinations which are not necessarily connected with either exaltation or despondency, and which yet may be attended by either. It will be preferable, therefore, after having taken a general view of this species of insanity, to notice more particularly the chief forms which it most frequently assumes.

98. *a.* General View of Partial Insanity. —The remark already made (§ 68) as to moral insanity is also applicable, and even more so, to partial disorder of the understanding; and this is, that the mind is not perfectly sound on subjects unconnected with the particular impression by which it is possessed and more prominently disordered. There are certainly cases in which the understanding seems quite rational on all topics excepting those connected with its illusion or hallucination; but, even in these, it will be found, on closer observation, more or less weakened or impaired, owing to

* [Some writers tell us that *lying* is also one form of partial moral mania, as well as *cleptomania*, or a propensity to steal. On this subject, see Am. ed. of Guy's *Principles of Forensic Medicine*, p. 209.]

deficient powers of attention and comparison. The individual affected is certainly, in ordinary circumstances, calm and devoid of those signs of perturbation and constant excitement characterizing mania, or raving madness. But it will be found that his habits and disposition have been long more or less changed; that he has presented a greater or less degree of moral insanity; that his powers of application and attention have been weakened for some time, and that an erroneous belief or illusion has gradually arisen in the course of these disorders. Very frequently a settled or habitual despondency, or melancholy, or moroseness of temper, or even a sullen misanthropy, has existed, has slowly increased, and has disordered and perverted his feelings and affections. Ultimately some delusion supervenes, which may at first be fugitive, but which afterward becomes more fixed and constant.

99. *α.* Dr. Holland very justly remarks, respecting the commencement of the slighter forms of partial disorder of the understanding, that many persons have felt, at one time or other (oftenest, perhaps, during the "severa silentia noctis"), some dominant idea or feeling to possess the fancy, retaining its hold with a sort of malignant power, despite all efforts to shake it off; and, by degrees, distorting the subject, especially if it be a painful one, into a thousand false and alarming forms. If this train of thought be interrupted, and time, society, and other objects come in between, the mind is conscious of passing, as out of a bad dream which for a while had overshadowed it. But let there be a cause for the continuance of this state, and we have an approach to monomania in some of its various shapes, nothing apparently wanting but the intensity, which is often so singularly testified in these cases by the actions induced, and by the long duration of the delusion. Pinel mentions instances where the same single insane impression continued without change for twenty or thirty years.

100. The illusion which torments the monomaniac is generally something bearing a near relation to his former habits of business, or to the usual occupation of his thoughts. In fact, the long persistence of the mind in one idea or feeling, not duly broken in upon, or blended with others, is, as Dr. Holland well remarks, a state always leading towards aberration. Indeed, the common, and often the only evidence of insanity, especially in its earlier stages, is that drawn from the dominance of a single impression, faulty, perhaps, only in the absence of those which should modify and correct it. It may be alleged that this reasoning tends to remove all distinction between the sound and unsound mind, and to reflect madness back, as it were, upon the healthy and natural state of the faculties of man. But this is not truly so. The extremes are widely apart, and are readily recognised. It is only in the slighter states of divergence, where mental health is lapsing into disorder, that marks of practical distinction may be difficult or misunderstood. The existence of more doubtful cases, graduating between reason and insanity, is but a part of that law of continuity which pervades both the moral and the physical world; and which, although furnishing difficulty to the legal consideration of insanity, yet should present but little to the adoption of appropriate moral and medical treatment.

101. It is often difficult to account for the occurrence of the hallucination disordering the understanding; but, as just observed, the illusion entertained is generally connected with the former habits, business, and opinions of the patient. Dr. Prichard remarks, that an individual of a melancholic temperament, long influenced by circumstances impairing his health and calling into play the morbid tendencies of his constitution, sustains some unexpected misfortune, or experiences great anxiety, becomes despondent, and broods over his feelings, till the prospects of life appear to him dark and distressing. His inclinations now are so altered that no motive can rouse him to exertion; his gloom and despondency increase; his imagination fixes upon some particular circumstance of a distressing nature, and this becomes afterward the focus round which the feelings which harass him concentrate themselves. This circumstance is often some real, occasionally some trifling act of delinquency, for which the patient expresses the strongest, and, perhaps, disproportionate self-condemnation. In other instances, an unusual phantom suggests itself in harmony with the prevalent tone of the feelings; and this at first haunts the mind as possible, and is at length admitted as reality. Some individuals begin by indulging morose or malignant feelings to their acquaintance; and, by magnifying in imagination every trifling neglect into a grievous contumely, they fancy at length that they find, in some casual occurrence, glaring proofs of premeditated designs to ruin them and expose them to the contempt of society. The disease in these cases has its real commencement long before the period when the particular delusion, which is only an accessory symptom, is discovered, and even before it became impressed on the imagination.

102. *β.* An undue indulgence in a single train of thought of any kind, particularly when involving any moral emotion, may lead to partial insanity, especially when the individual is physically disordered, or is out of health; when his digestive, assimilating, and excreting functions are deranged, and his nervous energies are weakened; and this is the more likely to occur if his intellectual and moral powers have been imperfectly or improperly cultivated in early life. In these cases, the insanity is gradually developed, or in a similar manner to that now described: in some it is the consequence of excessive devotion to a particular department of abstruse investigation; of exertion beyond the natural energy of the mind in one particular direction, and to the exclusion of countervailing healthful occupations of the intellectual and moral faculties, and of requisite relaxation of mind; in others, it gradually arises out of the habitual indulgence of some moral emotion or sentiment, or of some more violent passion, intellectual energy becoming impaired, and at length more obviously disordered. In many instances of this kind, as well as of the preceding, the insane delusion is occasioned chiefly by fears, anxieties, expectations, and excitements, of either a religious, a political, or a domestic nature, or even by the terrors produced in weak and susceptible minds by the

vehement language and denunciations of popular and other preachers. The following case adduced by Dr. Prichard illustrates the connexion of the hallucination with previous occupations, and with the moral influences to which his mind was subjected. A young man, whose father was frequently employed in criminal prosecutions, had assiduously attended the sermons of a preacher noted for the vehemence of his exhortations, and had devoted himself, to the neglect of sleep and bodily exercise, to studies for which he was unprepared. He became depressed in spirits, and disordered both in mind and in body. The morbid feelings which afflicted him at length conjured up an imaginary cause for themselves, that soon became indelibly impressed on his belief. He fancied himself suspected of some horrible crime, for which a process had commenced against him; and whenever the door of his room was opened, he supposed that officers of justice were coming to apprehend him.

103. It is unnecessary to adduce instances in proof of the position already stated, that the erroneous belief or delusion, constituting partial disorder of the understanding, is generally, or at least frequently, consequent upon, and afterward associated with previously existing moral insanity. Whether this connexion exists so universally as Dr. Prichard believes, I will not assert; but it doubtless may be traced in the great majority of cases. It will farther appear from what I have next to adduce, that the illusion is generally some notion as to the powers, property, or destination of the person affected, ingrafted upon his habitual state of desire or aversion, passion or sentiment; or an erroneous idea or belief arising out of morbid sensations, which the imagination, influenced by predominant feelings, emotions, passions, or trains of thought, converts into diversified shapes; and that the illusion consequently assumes a character and form more or less obviously moulded by such feelings and trains of thought.

104. *b.* Hypochondriacal Monomania. — *When the fears, apprehensions, and despondency of an individual are concentrated on his bodily feelings, relate to some disorder by which he is affected, and which he exaggerates, and are connected with an erroneous belief or hallucination*, a state of disorder exists, which may be aptly termed *hypochondriacal monomania, or hypochondriacal disorder of the understanding*. The mental affection here gradually supervenes in the course of the bodily disorder. The *first stage* of the malady is *hypochondriasis*, and does not, as I have contended (see the article, § 19), amount to insanity until the hallucination is manifested. It is true, that it is on the verge of insanity; that it is closely allied to it; and that it may be viewed, in its more fully developed states, as a variety of moral insanity; but still, until an erroneous belief is entertained, the mere exaggeration of bodily ailments, and the apprehensions, despondency, and concentration of the attention towards them, do not constitute, especially in the eye of the law, a true form of mental derangement. In the great majority of instances the hypochondriacal affection does not pass into or occasion an insane delusion; but when this change has taken place, and when a man fancies that his head is too large to enter in at the door, that his legs are made of clay, or that he has a fish or a demon in his stomacn, the nature of the disease is different, and in no respect doubtful.

105. A flatulent hypochondriac may ultimately suppose that a living creature or a demon, according as he may be influenced by religious or superstitious ideas, is actually lodged in his abdomen. Dr. Jacobi (*Samml. f. d., Werk. der Gemüthekrankheiten.* Elberj., 1822, p. 21) mentions the case of a man, quiet and rational on other topics, who entertained the notion that there was a person concealed in his belly, with whom he held conversations. He often perceived the absurdity of this idea, and grieved in acknowledging and reflecting that he was under the influence of it, but yet could never get rid of it. An attempt was made to cure this man by applying a large blister on his abdomen, and, when it was dressed, and the vesicated skin snipped, by throwing from behind him a dressed-up figure, as if just extracted from his body. The patient at first believed in the success of the performance, and was joyful in the full persuasion that he was cured; but some morbid sensation about the bowels, which he had associated with the insane impression, being again experienced, he took up the idea that another person, similar to the first, was still left within him.

106. *c.* Melancholic Monomania — *Melancholia* of authors—*Lypémanie* of Esquirol—*Tristimania* of Rush—*Melancholia with delirium* of Pinel—*is characterized by sadness and despondency, the mind being given up to fears and anticipations of evil, to an erroneous belief or impression concerning one subject, or a particular series of subjects.*—Authors, since Hippocrates, have applied the term melancholia to delusions characterized by sadness and despondency; and this form of insanity was, according to Galen, so denominated, because all the sad or desponding moral affections depended upon a depravation of bile, which had become black, and obscured and disordered the animal spirits. Cælius Aurelianus and most of the ancient writers did not distinguish between melancholia and hypochondriasis; and even the authors of the 15th, 16th, and 17th centuries continued to confound them, although various relations between melancholia and other affections of the mind were distinctly pointed out by them. M. de Héréda and Forestus first noticed the connexion of gloomy ideas and despondency with a partial delirium, or delusion, in this malady; and Sennert considered that the insane delusion was consequent upon despondency. Hoffmann and Boerhaave marked the relation between melancholia and mania, and the frequent origin of the latter in the former, thus regarding melancholia as a slighter grade or earlier stage of mania. Sauvages defined melancholia to be a partial or exclusive delirium, without furor or excitement, associated with a chronic disease. Cullen was among the first who took a correct view of this malady, and who carefully distinguished it from hypochondriasis; but it is chiefly to Pinel, Esquirol, and Guislain that we are indebted for accurate ideas as to its nature and relations.

107. *a.* Most writers have been more particular in their descriptions of the fully-developed state of melancholia than in pointing out the origin and rise of the malady, the importance

of which is by no means small, and have overlooked the commencement of it in the moral disorder already noticed. M. Guislain and Dr. Prichard have, however, remarked the absence of delusion in the more simple and early forms of the complaint. M. Guislain observes, that there are melancholics without delirium or hallucination, as well as maniacs without any remarkable disorder of the intelligence, and these exhibit the most simple form of the distemper. Such persons are sad, depressed, despondent, &c.; but evince no remarkable aberration of the imagination, of the judgment, or of the intelligence. In this stage or state of disorder there exists only a form of moral derangement, which may proceed no farther. But when erroneous notions or delusions, or a disposition to entertain an idea of suicide, or attempts to commit it, are manifested; or when any unusual or irrational determination is shown; then the disorder is no longer simple, but is fully developed and established, and actively influences the will.

108. In this state the patient is quite cognizant of what takes place around him; he appreciates more or less his situation, and recognises his friends and enemies; but fear, despair, or despondency, govern him; he is absorbed by the painful sentiment. Overwhelmed by it, prostrated, lying on his bed, or sitting with clasped hands, his head bent forward, his eyes obliquely fixed on their object, he presents the very image of sadness. His voice is low; his expressions and acts are slow, prudent, and distrustful; he answers only in monosyllables; seeks solitude, and is reserved. His countenance is pale or sallow; his features are altered; his brow more furrowed; and he appears older than he is. He often complains of a sense of weight in his head, and sometimes of a void or of a feeling of emptiness in his cranium, occasionally with uneasy sensations or pains in the scalp. His repose is unsound—his senses only being asleep, while his mind is awake; and he complains of not enjoying an hour of sound repose; but occasionally he is somnolent. He is kept awake by his fears, jealousy, or illusions; and when he dozes, he is terrified by phantoms and frightful dreams. One, after having passed a good night, is more depressed and unquiet. Another believes that he will not get over the day, and yet feels better as the night approaches; and a third has his inquietude increased at night, dreading the solitude, the obscurity, the sleeplessness, the frightful dreams and phantoms attending every attempt to get rest.

109. Some refuse for several days all kinds of nourishment, restrained by illusions or hallucinations which increase their chimerical fears. Some dread poison, dishonour, &c.; and others abstain from food in order to escape from a wretched existence, or to do penance for a supposed crime. The sensibility of some is acute, and the slightest occurrences produce the most vivid impressions. Heat, cold, rain, wind, light, noise, and all physical agents affect them inordinately. If there be the slightest cause of fear, they are terrified; if there be the least cause of regret, they are in despair; if they suffer the smallest reverse or disappointment, they believe themselves ruined. Their nervous system is morbidly susceptible, and their moral emotions, especially those of a gloomy kind, are remarkably exaggerated: they are physically and morally susceptible, and yet their sensibility is concentrated upon one object, or train of ideas. So complete is the concentration of their feelings, that they are almost inaccessible to impressions unconnected with the subject of their melancholy; a moral abyss separates them from all objects and sentiments that present no relation to their fears or delusions.

110. Anxieties and fears respecting any matter, and all the depressing passions, particularly when long indulged, or frequently reiterated, sway the intellect and judgment, and originate thoughts the most opposed to the dictates of common sense. These may ultimately pass into false perceptions and hallucinations, which will farther increase the unjust inferences, the morbid belief, the unfounded fears, and the terrors already entertained. Fear, in all its forms, whether proceeding from a real or an imagined cause, exercises a dominant influence on the melancholic. A person whose fears have been excited by denunciations against religion, becomes, under the influence of these fears, anxious and depressed; his sentiments and power of attention are concentrated upon the object of his insanity; his fears exaggerate their causes, as well as the consequences which these causes may produce; and at length delusions are generated and entertained, influencing not only his thoughts, but also his actions. The victim of fanaticism or superstition may thus ultimately believe himself to be pursued by the vengeance of Heaven; or he may become the prey of anxieties, as to his state, so intolerable as to lead him to prefer death to incertitude. He who has offended the laws continually apprehends the officers of justice; and, at last, believes himself in their power. Another, who has long dreaded the wickedness of man, ultimately believes that some one threatens his fortune, his honour, or his life; the least noise, sign, or doubtful word, exciting and confirming his fears or his belief. Some are afraid of everything, and are subject to perpetual anxiety, or are terrified by a vague sentiment, without motive or object. Their expressions, attitudes, actions, and discourse express extreme fear, which they cannot overcome, and which they cannot explain or account for.

111. The delusion of the melancholic derives its character from the moral affection which preoccupied the mind on the appearance of the malady. A merchant has experienced losses of little moment, and he believes himself ruined, notwithstanding demonstration to the contrary; two brothers have had a dispute, and one becomes persuaded that the other has an intention to murder him, to obtain his property. Frequently some one of the moral sentiments of the melancholic is so remarkably exaggerated as to predominate over every other consideration, and to give rise to acts of despair. Many of the murders committed during this malady are the result of this morbid state of feeling. A mother abandoned by her husband attempts to destroy her children, to prevent a similar misfortune; and a religious enthusiast kills his infants, to send them to heaven before their minds are corrupted.

112. Some melancholic persons are conscious

of the absurdity and the falsity of the fears by which they are tormented. They reason respecting them, and even are distressed at being the victims of their apprehensions; but still they continue a prey to them, and they find it impossible to think or act otherwise than under this dominion. An insurmountable power governs their reason, and they believe that the Almighty, or some demon, or fate, or some other power, influences them. The will of the hypochondriac is inflexible. No consideration or sentiment can overcome his alarms and errors, or his aversions.

113. *β.* The *physical symptoms* of melancholia vary much in different persons, and even in the same person in different periods of the disease. The patient sometimes has a sense of constriction in the chest, and places his hand over the heart, complaining of anxiety and oppression, or of pain in that organ. The pulse is more frequently slow than natural or accelerated. The tongue is often loaded, the appetite is impaired, the bowels costive, and the whole series of digestive functions more or less deranged. The urine is often pale and abundant.

114. *γ.* The *Diagnosis* of melancholia from hypochondriasis becomes a matter of some importance, seeing that they have been confounded by the older writers, and that the one may be mistaken for the other. Melancholia is more commonly hereditary than hypochondriasis, depending upon the melancholic temperament, which predisposes to the operation of the exciting causes, especially errors in education, and other influences acting directly on the brain, the sensibility, and the understanding. The causes which produce it are more generally moral; while hypochondriasis more commonly proceeds from causes which are physical, and which modify the functions of the stomach and other digestive organs. In melancholia there is a fixed delusion or insane idea, which is entertained with sadness and despondency, and a vicious association of ideas. In hypochondriasis, on the contrary, there is no insane delusion until the disease passes into melancholia; but the patient exaggerates his sufferings; his mind is continually occupied with his ailments, which he believes to threaten his life; and he is continually subject to dyspepsia and other disorders of the digestive functions. See article Hypochondriasis (§ 19).

115. *δ.* The *Causes* of this species of insanity are, the melancholic temperament, hereditary conformation or constitution, moral susceptibility, and increased sensibility; sudden shocks, reverses, disappointments, anxiety of mind, and all the depressing sentiments; frights, terror, fear; losses of fortune or of friends and connexions; political reverses, and changes, and revolutions; fanaticism, superstition, and unsound views of religion; wounded self-love, humiliating circumstances or occurrences; masturbation, and whatever causes physical and moral exhaustion; and injuries of the head. The *pathological* causes are chiefly, the suppression of accustomed discharges, protracted indigestion; and hypochondriasis, diseases of the heart, and of the digestive organs, obstructions of the liver and mesenteric glands, diseases of the uterus, &c. Most of these, however, are rather coincident disorders than influential agents in the production of the mental affection.

116. M. Esquirol states, that of 482 cases of melancholia, the chief causes were, hereditary predisposition, in 110; domestic unhappiness, in 60; reverses of fortune and distress, in 48; disappointed affection, in 42; the critical period of life, in 40; the puerperal state, in 35; venereal excesses, in 30; suppressed menstruation, in 25; intemperance in wine, in 19; frights, in 19; anger, in 18; wounded self-love, in 12; injuries of the head, in 10; jealousy, in 8; and masturbation, in 6. It is obvious, however, that this is only an approximation to accuracy, as, in many cases, several causes have concurred in producing the disease.

117. *ε.* The *course* of melancholia is usually continued, but is sometimes remittent, or even intermittent, or recurrent. It has even been observed to have been periodic. Its *duration* is most variable. When it terminates in health, the change generally takes place between the third and the thirteenth months; six months being about the average duration of these cases. Although there is so little moral reaction in this species of insanity, yet it is among those from which recovery most frequently takes place. A favourable change has been observed to follow the occurrence of a natural evacuation, especially when that has been suppressed, as the menstrual and hæmorrhoidal discharges, &c. It has also disappeared after the breaking out of boils and cutaneous diseases. The occurrence of hæmoptysis, of tubercular consumption, and of asthma, has sometimes been observed to dissipate an attack of melancholia; but the patient has died of the consecutive malady.

118. On the other hand, various organic lesions often appear in the course of melancholia, and are to be viewed rather as being favoured by it than as accidental occurrences. Certain of them, indeed, have been considered as concerned in the production of the mental disorder; but it is much more probable that the physical and moral changes are the results of the state of organic nervous influence, although the physical may augment the moral, and *vice versâ*, the one acting and reacting on the other.

119. *ζ.* The *visceral diseases* most commonly observed in the course of melancholia, or in fatal cases of it, are tubercular and other organic lesions of the lungs, chronic pleuritis, enlargements and engorgements of the liver, alterations of the heart and spleen, and various displacements of the colon, particularly the descent of the transverse arch. This last change was first insisted on by M. Esquirol, and has been observed in melancholia by Bergman, Wichmann, Hesselbach, Guislain, Muller, Annesley, and myself. The transverse arch is sometimes displaced obliquely, so that its left flexure is carried downward behind the pubis, and it occasionally descends perpendicularly, in a loop or duplicature, as far as the pelvic cavity. Displacements of this viscus are observed also in other forms of insanity, but not so frequently as in melancholia. M. Esquirol considers that organic lesions of the brain are not frequent in this species of the disease; the number of cases in which changes were observed by him in this part being much smaller than observed by M. Foville and others, who

have more justly appreciated the minute alterations which take place in it during mental disorders. M. ESQUIROL confirms the remark of LORRY and MEAD, that tubercular phthisis is the most frequent cause of death in melancholia, and subjoins the following enumeration of the organic lesions found in 168 cases: *Within the cranium*—thickening of the membranes, 2; organic alterations of the substance of the brain, 4; ossific deposites in the falx, 3; effusions of blood in the brain, 5. *In the chest*—organic lesions of the lungs, 65; disease of the heart, 11; effusion into the thoracic cavities, 6. *In the abdomen*—displacement of the colon, 33; adhesions and suppurations of the peritoneum, 5; ulceration in the stomach or pylorus, 6; ulceration in the intestines and rectum, 7; intestinal worms, 5; tænia, 1; organic lesion of the liver, 2; biliary concretions, 7; ulceration in the uterus, 6.

120. *η.* Melancholic monomania may *pass into*, or become *associated with*, some one of the other varieties of insanity, or even with more than one of them. It occasionally passes into mania, and even degenerates into dementia. In this state the patient retains the predominant ideas; but these are incoherent, without order, and do not harmonize with the actions; while previously the ideas were strong and fixed, and the determinations of the will were the immediate results of the characteristic delusion and trains of thought.

121. *b.* DEMONOMANIA.—The Chaldeans, the Phœnicians, the Jews, and the Greeks believed that most diseases, particularly those of the brain and mind, proceeded from demons or evil spirits. JOB was said to have been the victim of a demon; and SAUL to have been under the influence of an evil spirit. ARISTOPHANES termed the highest grade of madness, not *μανία*, but *κακοδαιμονία*. HERODOTUS was, however, nearer the truth, when he said that CLEOMENES had become mad from intoxication among the Scythians, and not by the presence of a demon. M. ESQUIROL has, conformably with the original acceptation of the word, comprised the two varieties of partial insanity about to be noticed, under the appellation of *Demonomania*. The first of these varieties, or *Theomania*, is still of frequent occurrence; the second, or *Cacodemonia*, was common in ancient times and during the prevalence of popish superstition, and, indeed, still frequently occurs in countries where superstition lingers.

122. *a.* The *Theomaniac* is characterized by an enthusiastic belief in divine selection and acceptance, and in the future eternal damnation of all who do not think, as to religious matters, exactly as he does; by a belief of having received revelations from the Almighty, or of being inspired, or of holding communications with the Holy Spirit, or with angels or saints; or by a belief of having received a mission from Heaven to convert sinful men. Persons who have had their minds inordinately excited by preachers who are themselves thus affected, or who are noted for the vehemence of their language, and by the enthusiasm of their belief in the more alarming or exciting topics of religion; or those whose thoughts have been long or painfully directed, especially during nervous exhaustion and susceptibility to these topics, and to the punishments of a future state, and have become impressed by exaggerated ideas of their own wickedness, not infrequently become melancholic, and, after a time, theomaniac. But while this latter state of mental disorder may thus appear consecutively in some, it may occur primarily, from the same moral causes, in others. In the former cases, it is a state of morbid mental reaction consequent upon the previous depression, and belief of condemnation; in the latter, it is a state of primary mental excitement, connected with more or less delusion. The instances of religious excitement furnished by the "revivals," the camp meetings, and field preachings in America and Scotland, the modern "gift of tongues" in this metropolis, are all forms of this kind of partial insanity; which, however, is sometimes of temporary continuance only, especially in hysterical and excitable females, but which often passes into more furious mania, or confirmed insanity. The frequency of this form of mental disorder in females, and other circumstances belonging to its history in this sex, show its occasional connexion with hysteria, and that at least the hysterical state favours its occurrence.*

* [If holding the above doctrines be considered a valid test of the existence or non-existence of insanity, we fear that the number would not be small in our country who would fall under the appellation. But that a reception of the doctrines of CALVIN, stern as they unquestionably are, should subject an individual to the title of insane, will hardly be conceded in a country where, in some places, a large majority of the inhabitants are believers in this creed. The followers of SWEDENBORG, now considerably numerous, who believe in holding communications with angels and saints, would also, according to our author, deserve the same appellation, not to include some of our ablest clergy, who claim to have received a divine commission to convert sinful men.

We are willing, however, to believe, and to express the belief, that what has been known under the name of "Millerism" is a true species of epidemic monomania. This delusion originated in a weak enthusiast, or theomaniac, by the name of William Miller, of the State of New-York, about the year 1840. He soon gained followers and adherents, who, imbibing the spirit and zeal of their leader, traversed every part of the country preaching the most extravagant doctrines, pointing out not only the year, but the day on which the material universe would be destroyed, and the "Son of Man should come, with power and great glory." In the words of Dr. HUNT (*Am. Edition of* ESQUIROL *on Insanity*, p. 331), "a doctrine like this, solemn and momentous beyond expression, spread abroad with all the rapidity that novelty could lend to it, the zeal of its adherents effect, or its importance inspire, soon collected around its standard throngs of ignorant men and silly women, who hugged the delusion as the announcement of great events, and the supporter of raptures and glorious ecstasies. The beggarly amount of intellect with which its deluded followers were possessed soon yielded to the force of religious excitement, and long before 'the time drew near when they were to be received up,' they forsook their respective callings, closed their shops and stores, left their families to suffer, or to the cold charities of the world, attending meetings for prayers and exhortations, 'rendering night hideous by their screams,' and by ceaseless prayers and watchings, intending to open in 'the great day of the Lord.'"

We need but allude to the extensive preparation of "Ascension Robes," the relinquishment of business and property, the pale and haggard countenance, and the wild fanaticism, in proof of the dereliction of reason and mental unsoundness on the part of the victims of this strange delusion. As might have been expected, large numbers of these deluded persons were received into our different hospitals for the insane; still larger numbers, it is believed, perished by disease, brought on by incessant watchings, fastings, and mental excitement; and though the day has long since gone by in which they believed the world was to be destroyed, there are not wanting those who still fan the excitement, and believe that the end of all things may be daily expected. We are among those who hold that toleration in religion should not extend to such fanatics, especially the leaders in such a moral epidemic, but that they should be placed under such restraint as may prevent their disturbing the peace and welfare of society. *Mormonism* is another form of monomania connected with certain religious or irreligious

123. *β. Cacodemonia.*—NEWTON remarks, that when men abandoned the worship of the true GOD, the stars became the first objects of their idolatry, as most striking to the senses, and were supposed to exercise a continued and active influence on the mind. Melancholy was then thought to depend upon the course of the planets; and the frequent periodicity of the disorder confirmed the belief. Hence, the word μηνη, luna, furnished the appellations mania, lunaticus, lunacy, for this and other mental disorders. The doctrine of spirits taught by SOCRATES, PLATO, and even by still more ancient philosophers, having become associated with Christianity, the influence of these spirits upon the human body became an article of general belief, and was implicitly received, until the Reformation, and the mental freedom to which it led, dispelled the mists of superstition. The dread of yielding to the instigations of the devil, and of being in the power of demons, led to the institution of exorcisms, and to ceremonies in the more primitive Church, to deliver those who were believed to be thus possessed. These ceremonies tended to cherish the idea as to the influence of evil spirits, and was, indeed, with various concomitant circumstances, the chief cause of the continued belief in this source of mental disorder. With the extension of popish superstition, the numbers of demonomaniacs increased, and, in many of the larger cities of Europe, stated feasts and ceremonies were established for their cure. The pomp and solemnity observed on these occasions, and the crowds assembled, struck the imaginations of those affected, and contributed to the cure of a few of them. In these times, demonomania assumed a variety of forms, and the most common and the most recent were those of sorcery and witchcraft. As long as both Church and state prosecuted and cruelly punished those objects of self-delusion and of popular belief, the community were firmly persuaded of the reality of demonomaniacal possession; but as soon as governments ceased to punish these extravagances, the chimerical fears which affected the populace, and by which the minds of the weak, of the melancholic, or of the hysterical were tortured, gradually subsided, and ceased to produce their wonted effects, and cases of this form of derangement were rarely observed. The progress, also, of education and of knowledge dissipated these errors, which led to and nurtured a belief in the influence of demons; yet still, in popish countries, some monomaniacs believe themselves in the power of demons, and furnish instances which may serve to illustrate or to explain the psychological extravagances which disgraced governments and religion for so many centuries. The delusions arising out of ignorance, improper education, and superstition gave rise, in those days, not only to the most humiliating errors of the understanding, but also to the most cruel exhibitions and actions of which human nature was capable. The history of mental delusions arising out of the superstitions, the wild doctrines, and the fanatical extravagances which disgraced Europe for so many ages, furnishes innumerable proofs, not merely of the narrow limits of the human understanding in those times, but also of the degraded state of the passions and moral sentiments. How frequent and how horrible were the instances which then daily occurred, not only of the delusions of ignorance and superstition, but likewise of the lowest depravation of moral feeling! A reign of superstitious terror continued to exert its baneful influence on the human mind, blighting the intellectual powers, and withering the most generous and ennobling of the moral emotions.

124. In the present day, although the instances of monomania arising from a belief in the power of demons or evil spirits are rare, those which proceed from other causes of terror—especially from the fears of future damnation, as inculcated by fanatics and enthusiasts, and from the dread of imprisonment or of civil punishment—are as numerous as ever, each case presenting characters derived from the principal cause of disorder. In modern times, M. ESQUIROL remarks—and especially during the civil commotions in France, in the end of the last and commencement of the present centuries—monomaniacs express as much dread of the tribunals of justice as they formerly entertained of the influence of demons and of evil spirits. It is always fear, dread, and anxiety which affect these unfortunate creatures, and cause the disorder which possesses them.

[M. ESQUIROL has treated of this form of mental disease with great ability, and the conclusions at which he arrives are, that demonomania is a variety of religious melancholy, having its remote causes in ignorance, prejudice, and the feebleness and pusillanimity of the human mind; that it is provoked by disquietude, fear, and dread; that the delirium and other phenomena of the disease are chiefly owing to false notions of religion and great depravation of morals; and, lastly, that it has become more rare since the more general prevalence of religious knowledge and education among all classes of society.

Demonomania often became *epidemic* during the Middle Ages, of which an interesting account may be found in HECKER. ESQUIROL tells us that, like all other nervous maladies, it propagates itself by a kind of moral contagion, and by the power of imitation. The *mal des andous*, which afflicted Holland, Belgium, and Germany in the fourteenth century, was a kind of demonomania. An epidemic of this kind broke out in Rome in the year 1554, in which nearly 100 persons believed themselves possessed of devils. Something of the same kind appears to have prevailed in Salem and some other parts of New-England during the prevalence of what was called the "Salem witchcraft." An epidemic of this kind broke out, in the sixteenth century, in a monastery in Germany, which affected all the inmates, and rapidly extended to the inhabitants of the neighbouring villages. The convulsionists of ST. MEDARD deservedly figure among the victims of moral contagion. We occasionally observe sporadic cases of this form of monomania in our lunatic establishments, but they are comparatively rare; we have, however, a modification of it, which is extremely common, and which is almost as

doctrines, which has obtained a strong foothold in our country, and the end of which is not yet. That a large majority of the followers of JOE SMITH are actual theomaniacs, no one acquainted with the extravagant pretensions of that arch-impostor can for a moment doubt; that they should be restrained from deluding others by the interposition of the law, we have just as little doubt.]

fearful in its consequences as demonomania itself; we mean that state of mind in which a person is brought to believe himself irrevocably doomed to eternal punishment, and is literally stricken with the terrors of hell. We not unfrequently meet with individuals of feeble intellect who imbibe the idea that they have committed the unpardonable sin, and that the Almighty has withdrawn his countenance and protection from them; and, though they do not, as yet, actually believe, like demonomaniacs, that they are already in the power of the devil, they are no less firmly persuaded that they are doomed to everlasting misery, and that there is no possible escape from such a destiny. Among the causes of such a delusion are, ignorance of the true principles of religion, a pusillanimous disposition and weak intellect, and especially the impassioned harangues of enthusiastic bigots and zealots. It is rather remarkable that those individuals who labour under this form of insanity are most inclined to suicide and murder. Esquirol says, it is because the evils which they dread, but do not feel, necessarily produce less effect upon them than those which they endure. Future ills can be but imaginary, while actual ones are realities.]

125. *c.* Misanthropic Monomania is sometimes met with, particularly in persons of a melancholic temperament, who have become hypochondriacal, or who have experienced disappointments in their affections and friendships, or who have been unfortunate in their attachments and well-founded hopes. In these persons, and even in others where the origin of the affection is less manifest, dejection of spirits is associated with malevolent feelings; and the resulting effects are, a distrust of every one, and a belief in machinations and persecutions intended for their ruin. They are in a state of continued misery; they believe themselves objects of universal hatred and detestation. They not only conceive plots of all kinds being formed against them, but also consider their dearest friends to be their most implacable enemies. They suspect poison in their food or drink; and their imaginations convert every act or every expression into designs to injure or to insult them.

126. *f. Excess of self-love* is an ingredient in every modification of monomania; but when exaggerated ideas connected with personal advantages or mental accomplishments are entertained—when self-love, in the more common forms of vanity or pride, is inordinately indulged—either the mind becomes disordered from the repeated or continued contemplation, or the mental disorder is coloured by this circumstance when produced by other causes. Dr. Prichard observes, that excessive self-love, combined with an elated and sanguine disposition, instead of depressed spirits and a morose temper, produces cheerful illusions, which always maintain their relation to the person of the lunatic. A monomaniac fancies himself a king, the pope, a favourite of Heaven. This, however, does not constitute a single delusion, leaving the mind perfectly sane upon other points; for the same individual generally magnifies himself in other respects. Nor does the gay and cheerful state of monomania always result from this association of excessive self-love with the sanguine disposition, as supposed by Dr. Prichard, but rather from a vicious education, and from the excessive indulgence of the emotions of vanity and pride, especially in early life, in connexion with various concurrent causes acting upon the nervous system of susceptible, weak, and nervous persons.

127. *g.* The preceding comprises all necessary to be stated in order to recognise the more simple states of partial disorder of the understanding. But, as these states are often consequent upon moral disorder, and occasionally are associated with it from the commencement, the physician should be prepared to meet with, in practice, numerous instances of *the association or complication of these forms of derangement.* To describe the almost innumerable modes in which each of the several forms of moral insanity may be complicated or associated with either of the varieties of partial disorder of the understanding would be endless; and even to adduce instances illustrative of some of the more striking states of this complication would be far beyond my limits, and be attended by few advantages. The works of Guislain, Heinroth, Prichard, and Esquirol furnish sufficient examples of this association, and to these I refer the reader. Besides, no one can possibly mistake cases of this description, when they come before him in practice, nor misapply the means, moral or medical, which they require for their treatment.

128. ii. General Insanity.—In general insanity, not only are the *moral emotions* and the *intellectual faculties* weakened or deranged, but all the *instinctive desires* and *feelings* (see note, § 66) are also disordered. The ideas are in a state of confusion, and perpetual and general disturbance, and none of the powers or manifestations of mind can be exercised even for the shortest period. General insanity presents three principal species, usually denominated *Mania*, or raving madness; *Dementia*, or incoherent insanity and mental imbecility; and, *Fatuity*, or annihilation of the mental faculties. To each of these I proceed to direct attention.

129. *A.* Mania, or *Madness—Hyperphrénie* of Guislain—*Raving Madness—is characterized by a disordered association of ideas, which are reproduced without connexion and with extreme rapidity, by remarkable derangement of the understanding or judgment, by alienation of the affections, by the violence of the will or volition, and, frequently, by false sensations, illusions, or hallucinations.* It is either a chronic disease, or liable to lapse from an acute into the chronic state; is commonly unattended by general fever, although the pulse is usually more or less accelerated, especially at an early stage; and it chiefly consists of *perturbation* and *exaltation of the sensibility*; of *disturbance of the instinctive, the intellectual*, and *the moral manifestations of mind*; and of *excitement of volition.*

130. *a.* The *acute form of mania* presents itself in different grades of intensity, the *mildest* of which has been denominated, by Guislain, *Tranquil Mania*, and may be named *sub-acute mania*; the most violent, as described by Chiaruggi and others, may be called *hyper-acute mania.* Either state, however, may pass into the other, and both may commence more or less suddenly, and reach their acme with great rapidity. Generally, however, *premonitory symp-*

toms, manifestly indicating very serious vascular disorder in the brain, have existed for some time before the mind becomes evidently deranged. In the case of an eminent writer on medicine, who died some years since, marked indications of vascular excitement in the brain were evident to me more than a twelvemonth before mania burst forth. Almost always for some days, often for some weeks, and even for months before the disease is established, occasional fits of excitement and perturbation, disturbing, for a time, the judgment, are experienced. The patient is, during this time, or at various periods, in a state of agitation, of feverishness, and of uneasiness. He is restless; morbidly active; his imagination is lively; he is full of projects, often trifling or absurd; and he enters upon pursuits with energy, but relinquishes them quickly, and without sufficient reason. His head is generally hot, his feet cold; his sleep is short, broken, and disturbed; and he either lies awake, ruminating on various speculations, or gets up, paces the room, or attempts to occupy himself, but each successive attempt is soon relinquished, in a state of perturbation or of quiet distraction. During this period, some experience fits of painful terror or of agitation, and not only pass sleepless nights, but by day are in a constant state of uneasiness and restlessness, or of action leading to the performance of little or nothing. Others are disquiet and depressed, and are impressed by a feeling of an impending calamity, or by a dread of losing their reason. In some, the appetite is voracious; but the stomach is readily disordered, and intemperance is followed by severe affection of this organ. In others, the appetite is deficient or capricious. The bowels are often torpid. At this period, a desire of intoxicating liquors, and intemperance in the use of them, are manifested suddenly, although previously disliked.

131. At length, reason is overturned. The individual scarcely knows what he says; repeats his words often, or talks nonsense, or is unable to complete his sentences, or suddenly breaks off in the middle of them. He utters confused expressions in a rapid or impetuous manner; or he makes ineffectual efforts to collect and to express his thoughts. He appears to those about him in a state resembling intoxication. He laughs, cries, is irritable, is prone to anger on the least opposition, and is most obstinate, self-willed, and capricious. This morbid state of mind may continue for some time —particularly when humoured by friends—without exciting much alarm, or leading them to adopt measures of restraint. At length, on some attempt being made to interfere with, or to oppose his absurd pursuits, he breaks out into the wildest violence, and even attempts acts destructive of or injurious to others or himself, and requiring the most strict coercion.

132. This state may exist without any false perception or delusion. Very frequently, however, as soon as violence is manifested, some illusion, or hallucination, or absurd impression as to his own person or powers, or his relation to others, appears; but it is seldom permanent, as in monomania; it is soon forgotten, or gives way to some other phantom.

133. *α.* In the *milder*, or *sub-acute cases*, the disease may proceed without much violence, unless the patient be greatly excited; but his emotions are capricious, warm, and enthusiastic, and his ideas are confused, inconsistent, or unconnected. He seems half drunk, and like one who endeavours to collect his thoughts and to express them connectedly, but fails in the attempt. His temper is irritable; he is self-willed; his habits, feelings, and affections are changed; he is incapable of any exertion, of attention, or of thought; is in a constant state of uneasiness and of restless action, without being capable of performing anything; and is altered in countenance, expression, and general appearance.

134. *β.* In *severer*, or *more acute cases*, or as the disease increases in violence, all the phenomena are more developed. The malady may proceed for many days, or even weeks, before it reaches its highest pitch. During this period the derangement varies somewhat, according to the predominance of particular feelings or passions. Sometimes the patient is terrified and agitated; frequently he breaks out into the most violent expressions of rage and enmity against his relations or friends, or whoever may have been obliged to exert control over him, or restrain his mad proceedings, uttering bitter execrations, or threatening vengeance and condign punishment. His nearest and dearest relatives are now the objects of his most vehement displeasure. As the malady approaches its acme, his ideas become more and more disordered and unconnected. His thoughts and feelings are expressed with exclamations and ejaculations, with the utmost agitation of countenance and manner, and with the most violent and irregular gesticulation and action. He is so absorbed by his internal sensations and emotions, as to be almost unconscious of external objects and impressions. He seems deprived of all affection, of all ideas of right and wrong, of every feeling of shame, of every principle of probity and honour, and of all parental or filial affection. The advice, conversation, or even the presence of near relatives, irritates or exasperates him. He utters the most blasphemous, the most filthy and indecent language, and the most injurious, calumnious, scandalous, and unjust expressions respecting his dearest friends. Many maniacs are disregardful of cleanliness and personal decency, and are most disgusting in their expressions and habits. They seem as if excited by an internal heat, enabling them to bear, often with complete impunity, the continued impression of great cold; and they sometimes even complain of it either in the head, or in the abdomen, or circulating in their veins. Hence their desire to go almost without clothes, or to expose their persons. They are occasionally deprived of sleep for many days, or even weeks, together. They generally become more or less emaciated, and the features haggard, wild, or maniacal. Their eyes are watery, suffused, red, prominent, brilliant, and fixed or vacant. Their motions are quick and threatening, and the expression of their countenances so changed as often not to be recognised by their friends. All the functions are now disordered. The bowels are obstinately costive, especially early in the disease, but afterward they are often irregular. The appetite is frequently lost for many days; but it is sometimes voracious.

The tongue is furred or loaded; the skin cold and clammy, excepting on the head; and a frothy saliva, mixed with mucus, is often excreted.

135. γ. The *most acute states of mania* have been graphically described by Pinel and Chiaruggi. At the commencement of such cases, the patient is impetuous, audacious, menacing in his aspect, and shameless in his habits; his forehead is contracted; his eyebrows are drawn up; his hair bristled, and his breathing hurried. His evacuations are deficient, and his skin becomes dirty and sallow. His countenance begins to glow; his eyes become fiery and sparkling; his looks unfixed; his eyelids drawn widely open and closely shut by turns; his eyeballs prominent or protruding and injected; he is insensible of cold and hunger; and his sleep is lost, or it is very short and unquiet. As the disease proceeds, his loss of reason, violence, and anger are remarkably increased; he shrieks, roars, rages, abuses his dearest friends; destroys or breaks whatever comes in his way; tears his clothes to pieces; and is often disposed to go quite naked, or with his person exposed. Whoever touches him is abused or struck by him. His ideas are strangely confused, and his mind is occupied by absurd prejudices or delusions. After a period of violence, stillness takes place for a short time; and when alone he talks, gesticulates, and exclaims, as if he were wrangling with persons about him. When restrained, or confined, his countenance assumes a satanical or ferocious expression: he throws away, with imprecations and shrieks, the food presented to him, but is compelled by thirst to swallow fluids. After some days, hunger begins to be felt; and often the most disgusting things are taken greedily. Even the excrements, in some instances, are devoured; and the evacuations, which are usually dark and offensive, are smeared over the clothes, beds, or walls. Notwithstanding the patient's constant exertion, and prolonged want of sleep, his muscular strength seems to increase; his limbs acquire remarkable pliability and nimbleness, and the greatest feats of strength and agility are performed without exhaustion. However bold and menacing he may be, a strong threatening voice, a piercing and commanding look, and even the sight of the means of secure restraint, readily daunt him. After his violence has expended itself, he becomes still or gloomy, and appears as if brooding over something; but he breaks out, often unexpectedly, into a new storm of rage and violence. At length a real cessation of violent paroxysms ensues: exhaustion, with unquiet sleep, disturbed by fearful dreams, takes place. The pulse becomes small, the general aspect squalid and meager, and the countenance pallid and haggard. The patient is now obstinately silent, or sings and laughs in a strange manner, or chatters with incessant volubility; and at times seems as if lapsing into a state of fatuity; but these uncertain intervals are frequently interrupted by short fits of violence. Memory, however, continues without much impairment during the course of the disease, and the senses possess an unusual degree of acuteness and susceptibility.

136. Acute attacks of mania generally attain their highest intensity, or begin to decline, in about a month from their commencement. In many, however, intervals, or remissions merely, of the violent symptoms occur, about or soon after this time; and from such remissions may be dated the accession of the advanced or chronic stage of mania. When patients do not recover after a succession of attacks, either the powers of mind are exhausted to so low a grade that the disease lapses into permanent fatuity, or the mental exhaustion continues as a period of calmness, after which an attack of violent madness recurs; or it passes into a state of melancholy, or of mental incoherency. As the maniacal attack becomes chronic and confirmed, so frequently does it assume either of these forms; but, in the more prolonged cases, sense and understanding are more and more completely abolished. During the more acute states of the disease, patients are rarely affected by any epidemic or contagious malady, and, according to several authors, dropsies, consumption, and various other chronic diseases have disappeared on the accession of violent madness. In many cases, however, the disappearance of these has been illusive, the maniacal affection merely *masking* the pectoral or other disease, which may have been in some degree interrupted in its course, but rarely removed, or even materially benefited.

137. *b. Chronic* or *protracted mania* is generally consequent upon either of the forms of *acute mania*; but it may follow any of the varieties of *partial insanity* already described, or it may appear as the *primary affection*. This last, however, is the least frequent mode of its accession. It is, in many instances, merely a stage of transition between acute mania and dementia, or incoherency, but a very protracted one in most cases, and of very uncertain duration. It often lasts for many years, and sometimes for the greatest part of life, and is the state of alienation presented by the great majority of the inmates of asylums. *Chronic mania* is characterized by marked impairment of the powers of attention, memory, comparison, combination, and, consequently, of judgment; and is a state of intellectual weakness, in which none of the operations of mind are performed with effect, often associated with some false perception or delusion. The individual is quite incapable of continued conversation, and of the duties of society: his conduct and actions are without consistency, steadiness, or rational object, and his thoughts are wandering and incoherent. He presents a state intermediate between either monomania or mania, and dementia or incoherency—a mental condition combining many of the phenomena of these disorders. It is to this class of cases, to this form of mania, that the term lunacy is, perhaps, most applicable. Dr. Prichard remarks, that many continue long to display the characters of mania, but, except during particular periods of renewed violence or agitation, to which most are subject, they become more tranquil than at the commencement of this complaint. They show signs of incipient dementia, combined with morbid activity of body, in which the excitement characteristic of their disease exhausts itself in almost perpetual action. Lunatics of a different class fall into a state of calm revery; their imagination, abandoned to itself, without the control of judgment, gives itself up to wanderings without end. Even in attempting to

converse, or when their attention is excited by questions, they exhibit a strange mixture of reason and mistakes, both as to facts and inferences. Others—and these are the most numerous—are governed by some particular passion, mental habit, or delusion; the illusion having reference to their own persons, or to their relations to other individuals.

138. The illusions in this form of disorder are not, like those in monomania, cherished in the mind, and brooded over in silence, in solitude, or in gloomy reserve: they are more connected with the present objects of sense, and are forever changing with the casual alterations of feeling or temper. In a great number of those who are threatened with general paralysis, or who are already attacked by it, M. Calmeil has shown a peculiar form of delusion to exist. The patient is in a state of exaltation or of joyous delirium, fancying himself the owner of millions, of towns, empires, &c. He is intoxicated by the flattering belief, and joy manifests itself in his features and gestures. Illusions of this kind often precede the accession of paralysis for several months, and continue for some time afterward; but they are gradually obliterated with the last traces of intelligence, as dementia becomes developed. In other instances, the joyous delusion assumes a form of maniacal delirium, with excessive agitation and anger; and continues with short intervals of quietude until death ensues, or until it terminates in dementia. In a great many protracted cases, the principal phenomena are referrible to some particular habit or active propensity, and are unconnected with any hallucination or false perception. Indeed, every variety of human pursuit occasionally becomes the subject in relation to which especially chronic madness is exhibited, and the disorder is displayed, in many instances, rather in the mode of action and conduct, and in the general weakness or abolition of certain powers of the mind, than in any hallucination or illusion.

139. *c.* The *course* of mania is *continued*, *remittent*, and *intermittent*. The *remissions* may be more or less distinct and regular. They often take place every second day. While there are many maniacs who scarcely ever sleep, there are some who sleep tolerably well. The former are often more quiet during the day than in the night. Others, again, are quieter and more impressible in the morning and in the evening. *Intermittent* mania is sometimes regular and sometimes irregular in its accessions. According to Esquirol, it constitutes about one third of the number of maniacal cases. It may assume either the quotidian, the tertian, or the quartan type; or the attacks may recur every eight days, or every month, or three months, or six months, or even after longer intervals. They are frequently induced by moral or physical causes, of a manifest kind, as contrarieties, and disorders of the stomach or bowels. Females often experience an accession of mania about each menstrual period, or after each lying-in, or when they suckle, or after weaning. In some it returns every spring, or every summer. Intermissions are more frequent in mania than in any other form of insanity.

140. *d.* Mania is sometimes *complicated* with cutaneous diseases, very commonly with hysterical symptoms in females, and often with hypochondriasis in men. It is frequently associated with epilepsy, and still oftener with paralysis, and with other forms of insanity: this last circumstance is the chief cause of doubt and difficulty in the classification of mental disorders.

141. *e.* The *Duration* of the malady varies from two or three days to many months or years. In its more prolonged forms it generally consists in a number of accessions and remissions. It may alternate with phthisis, hypochondriasis, and melancholia; but the pulmonary disease is only suspended during the maniacal attack. It may *terminate*, also, in either of these, but most frequently in dementia, paralysis, or fatuity, or in either dementia or fatuity conjoined with palsy.

142. *f.* The *Diagnosis* is apparent from the description I have given of mania. The more or less general disorder of the mental powers, and the turbulence, violence, and agitation attending it, sufficiently distinguish it from melancholia and other forms of partial insanity. In the latter, a few only of the affections, the passions, and the desires, or of the sensations, perceptions, or ideas are deranged. In mania, all the powers concerned in forming the understanding, and in distinguishing between right and wrong, are overturned; and the ideas, feelings, passions, and impulses arising in the mind violently influence the will, they being no longer controlled by the powers of the understanding, nor guided by notions of propriety. The violence, perturbation, and rapid transition of passion, of impulse, and of action, are consequences of disordered excitement, expressed more or less generally upon the moral emotions, and of deprivation of the instinctive feelings and of the intellectual powers, as well those of consciousness as of intellection and reflection. The moral emotions or affections of mind being morbidly excited and uncontrolled by the restraining and guiding influence of feeling and intellect—of affection and judgment—the disordered impulses of the will, and the disposition to commit absurd acts, become strong and violent, especially when opposed, unless the opposition be manifestly above removal.

143. *g.* The *Prognosis* is more favourable in this form of insanity than in any other, although the most violent and alarming in its symptoms. —*a.* A *favourable result* is often attended by some critical evacuation or change, and especially by discharges from the stomach or bowels; by bilious evacuations; by epistaxis, hæmorrhoids, menorrhagia, leucorrhœa; by ptyalism; by cutaneous eruptions, particularly boils, carbuncles, and erysipelas. As long as mania is simple, it is cured more frequently than any other mental disorder, and especially if there be no very apparent or strong predisposition to it. A first attack generally admits of cure if it be not complicated with palsy or epilepsy. A second seizure is also often removed if it remain uncomplicated. But recovery becomes very much more doubtful after the third attack. M. Esquirol states, that of 269 cases of mania that recovered, 132 were from first attacks, 77 from second, 32 from third, 18 from fourth, and 10 from a greater number of seizures. The duration of the disease, in cases of recovery, is

much shorter than in other forms of insanity, recovery generally taking place within the first year. Of the above 269 cases, 27 recovered in the first month, 32 in the second, 18 in the third, 30 in the fourth, 24 in the fifth, 20 in the sixth, 20 in the seventh, 19 in the eighth, 12 in the ninth, 13 in the tenth, 23 in the eleventh and twelfth, 18 in the second year, and 13 after the second year. The greater number of recoveries took place in autumn and summer.

144. *β.* An *unfavourable issue* is to be anticipated if mania has continued longer than two years, and if it be complicated with palsy, epilepsy, or any organic disease. It is certainly fatal in any of these complications, chiefly from the nature of the malady associated with it. Instances are very rare of simple mania terminating fatally. The most frequent maladies causing death in mania are typhoid, or adynamic fever with cerebral affection, general paralysis, pulmonary consumption, epileptic convulsions, and exhaustion of nervous power. M. ESQUIROL asserts that no appreciable organic lesion is found in the brains of those who have been subjects of recent uncomplicated mania; but in this, as will be shown hereafter, he is opposed by MM. FOVILLE, CALMEIL, BAYLE, GUISLAIN, HASLAM, PRICHARD, and others.

145. *h.* The *Causes* which produce mania more especially may be briefly enumerated.—*a.* The acute states of the disease take place most frequently in spring and summer, and chronic cases are often exasperated in those seasons, and in high ranges of temperature. The disease more frequently commences some time between the fifteenth and forty-fifth year than at any other epoch of life, and it is only in robust persons that it appears later than the fifty-fifth or sixtieth year. When it occurs at an advanced period of life, it is very apt to pass quickly into dementia, or to become complicated with paralysis; it also is more common in males than females, and assumes a more acute or violent form in the former than in the latter. Sanguine, nervous, and irritable temperaments, plethoric and robust constitutions, and susceptible and ardent dispositions are most predisposed to this species of insanity. Employments and professions have a less marked influence in causing it, yet it appears to be somewhat more frequent in merchants, speculators, military men, and artists than in persons otherwise occupied.

146. *β.* The individual occasional causes of mania are numerous, and very rarely act singly, but generally in various combinations, in producing their effects. In many cases there is not merely a concurrence of causes, but also a certain sequence in their operation necessary to produce the disease. A fright occasions suppression of the catamenia, and this is followed by mania, which subsides upon the return of the uterine discharge. *Moral* causes are more influential than physical causes. Disappointed affection, frights, jealousy, and domestic misery affect women chiefly; while mental exertion, reverses of fortune, and wounded self-love principally affect men. Of *physical* causes, hereditary conformation is by far the most common, and it is almost equally so in both sexes. The next in frequency are parturition, suppression of the catamenia, and abuse of spirituous liquors. The following enumeration is according to the influence they exert, as estimated by M. ESQUIROL. *Moral causes.*—Domestic unhappiness, disappointed love, fright, reverses of fortune, want, humiliated or injured self-love, excessive mental exertion, jealousy, and passion. *Physical causes.*—Hereditary disposition, parturition, disordered menstruation, the abuse of intoxicating liquors, venereal excesses, masturbation, the critical periods of life, injuries of the head, insolation, fevers, the suppression and disappearance of cutaneous eruptions and of accustomed discharges, the abuse of mercury, apoplexy, epilepsy, &c., hypochondriasis, and melancholia, have been also enumerated as causes, but they are, when observed, the early or premonitory stage of the malady. (See *General View of the Causes of* INSANITY.)

147. *B.* DEMENTIA — *Incoherency — Imbecility — Amentia*, SAUVAGES — *Incoherent Insanity*, PRICHARD—*Démence*, PINEL—*is a chronic form of insanity, characterized by impairment of the sensibility and of the will, by incoherence of the ideas, and by the loss of the powers of consciousness and of the understanding.*—A person thus mentally deranged is no longer able to perceive and apprehend matters correctly, to seize their relations, to compare them, or even to attend to them. He cannot comprise in his mind an exact idea, or even a tolerable notion of any one subject or object, but is occupied unceasingly with unconnected, incoherent thoughts, and with emotions arising spontaneously, without association or aim. PINEL defines this state of mental disorder to be an incoherency of ideas, which have no relation to external objects; a turbulent and incoercible mobility; a rapid and instantaneous succession of ideas which seem to be developed in the mind without any impression having been made upon the senses; a continual and ridiculous flux and reflux of chimerical ideas and notions, which destroy each other almost as soon as produced, without intermission and without connexion; a similar incoherent but calm concurrence of the moral emotions, of the sentiments of joy, sadness, or anger, which arise and disappear spontaneously, without leaving any trace, and without evincing any correspondence with external impressions.

148. *a.* An imbecile or demented person is deprived of the power of adequately perceiving objects or circumstances, of seeing their relations, of comparing them, of preserving a complete recollection of them; whence results the impossibility of reasoning or reflecting on them. He is incapable of forming any opinion or judgment, because external objects make too feeble an impression; because the organs of transmission have lost a part of their energy, or because the brain itself has no longer sufficient power to receive and to retain the impression transmitted to it; hence the feebleness, obscurity, and incompleteness of the sensations and perceptions. Being unable to form a just idea of occurrences or objects, the demented person cannot compare them, or exercise abstraction or association of ideas; his mind has not energy enough to exert attention, or any mental operation necessary to the integrity of its functions. Hence the most incongruous ideas succeed each other, without

dependance and without connexion or order; hence he talks without being conscious of what he says; and he utters words and sentences without attaching to them any precise meaning. It seems as if unreal expressions were heard by him in his head, and as if he repeated them in obedience to some involuntary impulse, the result of former habits, or fortuitous associations with objects which strike his senses.

149. A loss of the powers of perception, of attention, and of suggestion or association of ideas, and the consequent defect, or entire loss of memory—of the powers of consciousness and of intellection (see note, § 66)—are manifestly the earliest and fundamental changes constituting dementia, whether in its *primary* or in its *consecutive forms* (§ 150, 151). Hence the want of sequence or connexion between the ideas, the intellectual imbecility, and the assemblage of phenomena, which I have stated this disorder to present. It must be obvious that, originating in the failure of those fundamental powers, dementia will *vary in grade* with the amount of such failure, and that the resulting effects manifested by the higher faculties and by the moral emotions will also vary, not only in degree, but also in kind, according to previous habits, disposition, &c., giving rise at first to *imbecility* or to *incoherence*, the two slighter grades of *dementia*.

150. Incoherency, imbecility, or complete dementia, appears either *primarily*, from the operation of the predisposing and exciting causes upon the mind or constitution; or *consecutively* upon other disorders of the mind or brain, which, by their long duration, or their severity, affect the alliance of the former with the latter, and the intimate condition of structure of the brain more especially. When dementia occurs *primarily*, it is usually caused by whatever overwhelms the powers of the mind, or completely exhausts them, as inordinate mental exertion, vehement emotions, protracted and inordinate anxiety; and, as I shall have to point out hereafter, it may thus appear primarily, not only as simple incoherency, but also complicated with general paralysis or epilepsy.

151. Where dementia takes place *secondarily*, it is generally directly consequent upon protracted mania, or upon partial insanity, or upon apoplexy, severe phrenitis, epilepsy, palsy, irregular gout, or fevers attended by cerebral determination and severe or protracted delirium. This consecutive state of dementia has been termed fatuity; it was confounded with idiotcy until ESQUIROL very accurately distinguished between them, and showed that dementia is exhaustion or obliteration of an intellect which was once sound, by intense mental causes, or by maniacal or other diseases; whereas, idiotcy is a congenital state of fatuity, or an original want of the intellectual powers. The idiot, he remarks, has never possessed the faculties of the understanding sufficiently developed for the display of reason. The victim of dementia was once endowed with them, but has lost this possession. The former lives neither in the past nor in the future; the latter has some thoughts of times past, reminiscences which excite in him occasional gleams of hope. The idiot, in his habits and manners of existence, evinces the semblance of childhood; the demented person preserves, in his conduct and acts, the characteristics of consistent age, and bears the impress derived from the anterior state of existence. Idiots and Cretins have never possessed memory, judgment, sentiments; scarcely do they present, in some instances, indications of animal instincts; and their external conformation plainly indicates that their organization is incapable of thought.

152. M. ESQUIROL has distinguished *three varieties* of dementia, viz., the *acute*, the *chronic*, and the *senile*, either of which may be *simple*, or *complicated* with melancholia, mania, epilepsy, convulsions, scorbutus, and especially with general paralysis. The *first variety*, or *acute dementia*, is caused by gross irregularities of regimen, diet, &c., by fever, hæmorrhages, by metastasis, suppression of accustomed discharges, and a lowering treatment of mania. It is sudden in its attack, is unattended by lesion of movement, and is curable by means of regimen, exercise, and restoratives, by the removal of the cause, &c. The *second*, or *chronic dementia*, is either primary or consecutive upon the diseases just mentioned: more frequently the latter. When it succeeds other forms of insanity, as mania or monomania, it preserves some traces of the character of the primary disorder, or of the dominant idea during the previous affection. When it is caused by drunkenness, it presents peculiar characters, the chief of which are general tremour, false perceptions, rapid pulse, general perspiration, &c., and it closely resembles *delirium tremens*, which, indeed, may be more correctly viewed as an acute form of dementia, than as a distinct malady. When dementia arises from this cause, it more frequently assumes an acute and a curable form, than a chronic and persistent state: a circumstance which seems to have escaped M. ESQUIROL. The *third variety*, or *senile incoherency*, comes on gradually with the progress of age, and shows itself in the loss of memory and of sensibility, in the weakness of the impressions and sensations, of attention and perception; in the vacillations, and uncertainty of the will, and in the slowness and incapability of motion.

153. Dr. PRICHARD considers that incoherency presents *four stages*, or *degrees*, consisting of different phenomena; the description of the one stage not being applicable to the other. If the disorder commences in the first degree, it goes on successively to the more advanced; but the more severe degrees may appear at once, as the immediate effects of causes which destroy the powers of mind or produce disorganization of the brain. The *first stage*, or degree, he remarks, may be termed that of *forgetfulness*, or loss of memory. Its chief characteristic is a failure of memory, especially as to recent events. The *second stage* brings with it a total abolition of the power of reasoning, depending on a loss of voluntary control over the thoughts. It may be termed the state of *irrationality*, or *loss of reason*. In the *third degree*, the individual is incapable of comprehending the meaning of anything that is said to him. It may be styled the stage of *incomprehension*. The *fourth stage* is characterized by loss of instinctive voluntary action. The individual is destitute of even the animal instincts; he can-

not obey the calls of nature. This is the stage of *inappetency*, or *loss of instinct or volition*.

154. The *first* of these, however, does not amount to dementia. It is often a premonitory state, or stage, which passes into complete incoherency or imbecility; but it as often continues simple and stationary, without passing into more marked disorder. This is especially the case in old persons. They often lose their memory, particularly of recent events; and their sensibility, and the power of quick or rapid movement, become impaired. Recent impressions in them are weak; and hence they live upon past recollections, which they have pleasure in recalling. But their powers of reason and their judgment are not materially weakened; and, until these become very manifestly affected, they cannot be viewed as presenting even the slightest form of this species of insanity. The *second* and *third grades* of dementia particularized by PRICHARD, are the common forms in which the disease occurs in either its primary or its secondary states. In these the powers of reason are lost; and the patient is as unable to control his ideas as he is incapable of comprehending the meaning of anything to which his attention may be called. The *fourth grade* is identical with the varjety of general insanity about to be noticed under the head of *Fatuity*, or annihilation of the powers of mind (§ 164).

155. *a*. The *slighter forms* or *grades* of dementia, or *incoherency* and *imbecility*, are evinced by a loss of control over the ideas, and of the faculty of attention. The individual occasionally apprehends something of the meaning of a question, but before he has uttered half his reply he becomes confused or bewildered, and is turned aside from it by some accidental or new suggestion. His expressions are consequently irrelevant and absurd. In this state, his memory may not be altogether lost, though very much impaired, and glimmerings of reason are occasionally evinced. He affixes some meaning to his expressions, but he soon loses or forgets it. He may know his friends, but he displays no signs of sensibility or of emotion on being visited by them. In such cases, the *incoherency* is remarkable. In others, the impairment or loss of the powers of consciousness and of intellection (see note, § 66), and a state of intellectual *imbecility*, are more or less manifest. Some patients, in these states, are capable of being employed in mechanical occupations, and particularly in what they had previously been habituated to; but even in these their imbecility is often conspicuous. Others, particularly when dementia is consequent upon mania, experience occasional paroxysms of excitement, in which the symptoms of more active mental disorder become prominent.

156. *β*. The *severer* or *confirmed states* of dementia are characterized by inability to comprehend the meaning of any question, however simple. Reason is entirely lost, and the person acts from instinct or habit. The physical activity is often remarkably displayed in this state of the disease. Some jump or run to and fro, or walk round in a circle; or dance and sing, or occasionally vociferate. Others cry or laugh by turns, or almost at the same time, or utter the most unmeaning jargon, or words without ideas, or mutter broken sentences, or expressions without any connexion, or evincing the most trivial association, which may depend upon accidental sound, or some sensible object attracting momentary attention. Many sit in silence, with a sedate look, or a vacant smile, or an unmeaning stare, and hardly utter a word for weeks, months, or even years. Some crowd round a stranger and gaze at him, having intelligence barely sufficient to perceive something new; and others have a propensity to ornament themselves in a strange or a fantastic manner, or to add whatever may be in their way to their dress, which is always singular or ridiculous. A few continue crouched in a particular posture, which they always prefer, though it seems the most uneasy or painful; and, if placed in a different position, they soon resume their accustomed posture.

157. *γ*. The disorder of the sensibility and of the understanding is, to a certain extent, portrayed in the *countenance*. The features are motionless and devoid of expression. The look is wandering or vacant. The face is pale; the eyes are dull and moistened with tears; the pupils are dilated; and occasionally the features are distorted from relaxation of some of the facial muscles. The body is thin and emaciated in some cases, and full and fat in others. In these latter, the face is full, and the conjunctiva occasionally loaded. In a few, but little indication of mental disorder is evinced by the countenance.

158. *δ*. The *bodily*, and especially the *organic functions*, are not materially disturbed. Sleep is sound and prolonged. The appetite is unimpaired, or it is increased almost to voracity. The alvine evacuations are free, sometimes fluid; and in many cases corpulency supervenes. Occasionally, when mania or monomania is about to pass into dementia, the transition is indicated by obesity. When paralysis appears in the course of the disease, the paralytic symptoms manifest themselves slowly and successively. Articulation is first impaired, afterward locomotion is executed with difficulty, and, lastly, the evacutions become involuntary. But this complication is only contingent, and as such will be noticed hereafter.

159. *ε*. The *course* of dementia is occasionally *acute*, but much more commonly it is *chronic*. It is *simple*, or *complicated* in the manner about to be noticed. It is generally *continued*, but it is sometimes remittent, or even intermittent. Its duration is most various, from a few days or weeks to many years.

160. *b*. The *Diagnosis* of dementia cannot be difficult, excepting at the time when mania or monomania is passing into this state, and then the symptoms will indicate the predominance of either. Maniacs and monomaniacs are carried away by false sensations and perceptions, by illusions and hallucinations, by the excitement, the exuberance, and the determined character of their ideas and of their emotions: the demented person neither imagines nor supposes anything: he has almost no ideas; he neither wishes nor determines, but yields to every the slightest impulse or suggestion: his cerebral power is exhausted. In the maniac or partially insane, everything announces power and strong effort; while in the demented person, everything betrays relaxation, feebleness, or complete mental impotence.

161. *c.* The *Causes* of which dementia is more especially the consequence are either moral or physical; but the two orders are often associated, or the one is accessory to the other, in their operation. *Moral causes* affect females more frequently than males, and the higher than the lower ranks of society, but are much less influential in occasioning this than the other forms of insanity. They are chiefly, excessive or frequent excitements of the passions, domestic unhappiness, political commotions, frights, sudden grief or joy, disappointed affection and ambition, misfortune and want. *Physical causes* are the most concerned in occasioning this species of insanity. The progress of age, fevers with cerebral determination or predominant affection, congestion and chronic inflammation of the brain and its membranes, the cessation and disorders of the catamenia, are the most common of this class. After these follow, masturbation and venereal excesses, the abuse of intoxicating liquors and of narcotics, the excessive use of mercurials, parturition and the accidents consequent upon it; epilepsy, apoplexy, palsy, injuries of the head, and excessive or prolonged mental exertion, especially when prematurely commenced, or before the brain is duly developed, suppression of cutaneous eruptions, of gout or rheumatism, and of accustomed discharges, have likewise caused, or contributed to cause, dementia. This species of mental disease is, however, most frequently consequent upon mania, or some one of the several forms of partial insanity, especially when these have been treated by too large sanguineous depletions, or by other too active and lowering means.

162. Hereditary conformation or influence, the phlegmatic and lymphatic temperaments, debility caused by irregularities and excesses, and exhaustion of cerebral power by these or by inordinate indulgence of the passions, weak, timid, or irresolute constitutions of mind, and original feebleness of the intellectual powers, *predispose* to dementia.

163. *d.* The *Prognosis* of dementia is extremely unfavourable, especially as respects the more severe cases. In the milder states or stages of the malady, a few instances of recovery occur, especially when a paroxysm of acute mania supervenes. The apparent reaction of the system is, in these cases, sometimes followed by perfect rationality. Attacks of fever attended by delirium are often fatal to lunatics; but of those who recover from them, not a few have their faculties restored to them. When the physical health of persons in dementia improves at a time when the mental disorder seems to be increasing, and especially if they eat, sleep, and digest well, and become fat, recovery may almost be despaired of. If any of the *complications* about to be noticed take place, recovery can no longer be anticipated. Even in this state, patients may linger for many months, or even years, until carried off by the extent of cerebral lesion, or exhausted vital power, or by the complications of the malady, or rather by the organic alteration on which the complications more immediately depend. The *changes* found on dissection of fatal cases will be described hereafter.

164. *C.* FATUITY, or *Annihilation of the Powers of Mind.*—This may be viewed as the last stage, or an extreme degree of dementia, but it sometimes follows almost immediately upon mania or some one of the forms of partial insanity.—*a.* In this state, all the mental powers, and even most of the animal instincts, are lost. The individual continues to possess a state of organic existence, but deprived of all the functions of the brain, and nearly of all the functions of sense. He is scarcely conscious, evinces little or no desire or aversion; is often unable to control, or is not cognizant of, the calls of nature. One stands in a state of vacant unconsciousness; another sits rocking himself to and fro, or yelling or chanting unmeaning words; a third is quite motionless, with his head hanging on his breast, or with his eyes and mouth half open. In this state, the patient is often destitute of the feelings of hunger or thirst, and occasionally even of that of pain. He may linger in this condition for years, but he can never altogether recover from it. A few may be roused, by favourable circumstances, to a less extreme state of mental annihilation than I have described—to a state of dementia above this in the scale of intellectual privation—but a relapse always occurs after a short time.

165. *b.* Fatuity is often *complicated* with partial or general paralysis; and, occasionally, attacks of convulsion or of epilepsy take place, and sometimes terminate this state of existence. In most instances, and especially when fatuity is complicated, the countenance assumes a peculiar character, owing to the absence of all action in the muscles of the face, to the general relaxation of the features, and to the laxity of the integuments of the cellular tissue. The whole frame indicates, by a flabby state of the tissues, the exhausted condition of cerebro-spinal nervous power. The organic functions are generally but little disordered, excepting as respects the processes of excretion. Owing to defective voluntary control, and the unconscious state of evacuation, the patient often presents a state of disgusting filthiness difficult to be prevented, and requiring strict attention, in order that the consequences to which neglect uniformly leads may be warded off.

166. ii. COMPLICATED INSANITY.—The several forms of insanity—of the partial as well as the general disease—are often variously complicated. Not only may the different varieties of partial insanity be associated in numerous modes, but general insanity may present, especially when consequent upon monomania, a predominance of disorder as respects certain ideas, feelings, or trains of thought. I have already shown that moral insanity often passes into disorder of the understanding; and that, in such cases, not only both states of derangement subsist, but some additional disorder, in many instances, is at last superadded. Thus, states of general alienation, more or less complete, are often ultimately developed, presenting either of the states of mania or of dementia, often with prominent disorder on certain subjects, or a disposition to entertain certain emotions or ideas in preference to any other. These states of alienation, however, can hardly be denominated complications, inasmuch as they are various modes in which the mental disorder generally goes on increasing, when uncontrolled by treatment, until the powers of

mind are altogether overturned, or even annihilated. The morbid associations, therefore, to which I now proceed to direct attention, are strictly complications, or contingent associations of bodily disease with insanity, and are of so frequent occurrence, and of so great importance in regard of the course and termination of the cases in which they are observed, as to require a particular notice. The circumstance, also, of the mental disorder, and the contingent bodily disease, generally proceeding from a source common to both—from derangement of the circulation within the cranium, and often from organic lesion, either intimate and hardly appreciable, or gross and obvious—also demands a more special consideration of this subject.

167. *A.* The Complication with general Paralysis is the most common and the most important of any that occurs in practice. I have already fully described its different *stages* or *degrees* (§ 33, 36), and shall notice, at this place, certain particulars only that did not fall within the scope of that description. This form of paralysis is often indicative of chronic inflammation of the meninges, and is distinct from the paralytic affections consequent upon cerebral hæmorrhage, or upon softening, tumours, &c., of the brain, which, however, may also be complicated with insanity, although much more rarely than the general form of the affection above described. It, in a few instances, precedes, and in most supervenes upon, the mental disorder. It sometimes appears with the first symptoms, or during the acute period of insanity, and generally commences in the manner I have stated (§ 33), and increases as the mental powers diminish. Whatever form the mental disorder may have presented, it soon passes into chronic dementia, when complicated with paralysis. It generally terminates the life of the patient within three years; death being preceded by cerebral congestion, convulsions, diarrhœa, and gangrene of those parts sustaining the weight of the body when muscular support has been lost. This form of paralysis is much more frequent in men than in women. Of 109 insane paralytics under the observation of M. Esquirol, during three years, at Charenton, 95 were males. Of 609 lunatics admitted at this institution in three years, 109 were paralytics; the proportion in males and females being, in 366 male lunatics, 95 were paralytics; and of 253 females, 14 were thus affected. Of 334 lunatics in the Asylum of St. Yon, near Rouen, 31 were paralytics—of whom 22 were men, and 9 women. At the Bicêtre, the proportion of paralytics to the number of lunatics is much smaller. It is observed by M. Esquirol, that this complication occurs most commonly in those lunatics who have caused their insanity by venereal excesses, by intoxication, by the abuse of mercury, and by mental exertion: circumstances which account for the greater prevalence of it in males than in females. The lunatics at Charenton, where it is most frequently observed, have been in easy circumstances, and have possessed means of gratifying their passions, or have exercised professions which have excited or over-exerted the brain, without duly exercising the body.

176. According to M. Calmeil, this affection has generally, at Charenton, appeared soon after the commencement of insanity; but it sometimes has not occurred until insanity has continued for many years. A few individuals have displayed all the vigour of intellect for some time after they were attacked by it, and derangement has afterward taken place. If the mental disorder has not already proceeded, it very rapidly proceeds, in this complication, to advanced or complete dementia; yet persons thus affected preserve their appetites, or have them greatly increased. They are in all other respects in health. The circulation is natural, and the sleep undisturbed. They continue plump, but the soft solids are flabby and soft; and, as the disease proceeds, they are liable to constipation, often followed by diarrhœa, by unconscious evacuations, and by want of power over them, owing to palsy of the sphincters. Retention and incontinence of urine generally also take place, and aggravate the evils to which the paralytic person is liable.

168. *a.* The *duration* of this complication is various; but is reckoned by MM. Esquirol and Calmeil to average about thirteen months, very few surviving longer than three years with it. The ultimate *prognosis* is most unfavourable. M. Royer-Collard, after an experience of twenty years, had not met with one instance of recovery from it. M. Calmeil has seen only two cases, thus complicated, that recovered; and M. Esquirol has mentioned only three. The appearances observed after death will be stated hereafter.

169. General paralysis is apparently more frequent in Paris than elsewhere. There can be no doubt, however, that it has been more accurately observed among the insane in that city, and, indeed, through many parts of France than elsewhere. Dr. Burrows had stated it to be comparatively a rare disease in England. M. Esquirol doubted this, and inferred that it was considered rare because it had not been accurately observed in this country. There is much truth in this, as shown by the recent inquiries of Dr. Prichard. This physician states that he had made many inquiries with a view to determining this question, but had met with considerable difficulties in obtaining satisfactory information. The facts, however, which he has adduced prove that this is a frequent complication of insanity in this country, although not so frequent as in Paris; and in every respect confirm the accuracy of the observations furnished by MM. Esquirol, Calmeil, and other French pathologists.

170. *b.* There is a modification of paralysis, as Dr. Prichard truly remarks, of frequent occurrence during protracted insanity and dementia, in English hospitals for lunatics, that differs in duration, and in some of its features, from the general paralysis so accurately described by the French writers. It resembles the debility or decrepitude of extreme old age. Patients affected by it sit crouched with their heads hanging down; and when they attempt to raise themselves into the erect posture, their limbs tremble, they stoop, and totter. Some stand leaning against a wall for whole days, with their bodies curved forward, their heads and necks hanging down, and their upper extremities shaking and hanging useless. Such patients are always in the most advanced stage of dementia, and often continue in this state of

paralytic decrepitude for many years. Some become bedridden, and remain long incapable of any voluntary movement, until at length either the powers of life are gradually extinguished, or they are carried off as in the form of paralysis previously described (§ 33).

171. *c.* Paralysis from cerebral hæmorrhage, from softening, from tumours, or from other organic lesions of a portion of the brain, is also observed in insane patients, but not so frequently as the varieties of this affection already noticed. In these cases, it generally assumes the form of hemiplegia; but it sometimes continues in a partial or limited state, being confined to one arm, or to the muscles of one side of the face, or to the arm and face, for a considerable time. It may even proceed no farther, although more commonly it passes into palsy of the whole side. In these the attack is gradual, slow, and *chronic*; and usually proceeds from softening, or from some other change of structure, in a portion of the brain or of its membranes. In other cases, the paralytic affection is more sudden and *acute*, and is consequent upon an apoplectic or comatose state, or upon an epileptic or convulsive seizure. It may be at once hemiplegic; or it may be at first more partial, and become more complete, either gradually, or after relapses or repeated attacks of sopor or convulsion. This more acute form of palsy seems to proceed from congestion or sanguineous effusion in the brain; but it has occurred without any organic lesion having been found to account for it. (See *Appearances in the Brain in Paralytic* Insanity.)

172. The more usual forms of paralysis may precede the insanity; but they most frequently take place in the more confirmed and chronic states of mania, and especially in dementia and fatuity. They are evidently more or less intimately connected with the pathological conditions upon which insanity depends, as well as with the consequences which these conditions produce, as will be shown hereafter. While palsy in the insane is generally incurable, insanity is equally so when thus complicated.

173. *B.* Vertigo, or *Giddiness*, often precedes and accompanies insanity. The two forms of vertigo—the one from active congestion of blood in the brain, the other from a defect of the supply of blood to this organ—may attend mental diseases. It is extremely necessary to distinguish between these two opposite conditions of the cerebral circulation with reference to this affection. When vertigo proceeds from the former state, it is characterized by a sense of rapid gyration in the head, by throbbings in the temples, a beating noise in the ears, succeeded sometimes by vomiting or nausea, and occasionally by loss of consciousness: when it arises from the opposite condition of the circulation, it resembles a gradual swimming—objects appearing as approximating or receding from the organs of vision, or becoming dark—and is attended by a sense of faintness. It is requisite to attend to these two very different forms of vertigo, inasmuch as they indicate important and opposite states of the cerebral circulation; and, as in the more partial forms of insanity, they often precede the accession of mania, or the occurrence of some dangerous complications.

174. *C.* Epilepsy and Convulsions are frequent complications of every variety of insanity. Either of these affections—either the regular paroxysm of epilepsy, characterized by sudden loss of consciousness, frothing at the mouth, injury of the tongue, and subsequent sopor; or the more gradually developed fit of convulsion, in which these phenomena are not present—may precede or follow the mental disorder. In every instance, congestion or determination of blood to the head becomes remarkable during the paroxysm, although there may have been a deficient supply of blood to this quarter shortly before. The occurrence of these complications is generally owing to insolation, to suppression or disorder of the catamenia, to violent excitement or exercise, especially during warm weather, to injudicious bathing, to the use of intoxicating liquors, to venereal excesses and masturbation, to habitual gluttony or excesses at table, and to the other causes enumerated in the articles on these diseases. Epilepsy occurs most frequently in those who have complained of vertigo, headache, incubus, and of restless, dreaming sleep; and an attack is generally preceded by some of these symptoms, or by an aggravation of mental disorder.

175. Insane persons, predisposed to epilepsy or convulsions, as well as epileptics disposed to insanity, generally present a peculiar prominence of the eyes, sometimes with a puffy or wrinkled state of the surrounding integuments, partly arising from congestion of the blood-vessels, and particularly of the veins, in the vicinity. This is observed also in mania, and still more in epileptic mania. The eye also has a kind of glaze over it, distinguishing it from the convex eye of near-sighted people.

176. When an attack of epileptic or other convulsions is followed by mania, or any other form of mental disorder, the latter often disappears, sometimes in a few days or weeks, under judicious treatment; but it always returns with the convulsive affection, and after repeated attacks the mental disorder becomes more severe, more general, as respects the mental powers, and more confirmed, until the patient rapidly sinks into dementia or fatuity, in which state apoplexy, or some one of the forms of palsy, is sometimes superadded. In this case, life is terminated, after an uncertain time, either by a paroxysm of convulsion, or by one of the later complications. Although epileptic mania generally pursues this unfavourable course, when neglected or injudiciously treated, yet it sometimes admits of alleviation, or even of cure, when judiciously managed. When epilepsy or convulsions occur in the course of any of the more chronic forms of insanity, the latter is very rarely cured; if death does not take place soon, it lapses into complete dementia or fatuity.

177. Mania complicated with epilepsy is characterized by ferocious, malign, and often murderous paroxysms, or exacerbations, which frequently take place most suddenly. The fury of the patient is sometimes directed against himself; but oftener against others, especially those he most loves when sane. Dr. Burrows observes that when paroxysms of mania suddenly attack persons subject to epilepsy, a reckless fury is exhibited by them, different from the characters of true mania. It seems as if the epileptic impulse, when not ending in convul-

sion, acts upon the brain in a peculiar mode, imparting to it that particular action denominated epileptic mania. The most horrible actions have proceeded from this complicated form of insanity. Sometimes the destructive paroxysm or impulse is produced by some fanatical opinion or idea, prompted by a misconstruction of some scriptural passage, by some delusion or waking dream. Persons thus affected may have lucid intervals of considerable duration. But although the paroxysms are sometimes preceded by some signs or symptoms, yet they are often so sudden that mischief is occasionally done before it can be prevented. Hence epileptic maniacs should not associate with other insane persons, and especially as the sight of epileptic paroxysms may produce the like in other maniacs. The appearances observed after death in epileptic and convulsive insanity will be noticed hereafter.

178. *D.* Apoplexy may be the *cause* of insanity, or it may be the *consequence* of those intimate lesions of structure which either occasion or are connected with the mental disorder. Esquirol considers that apoplexy constitutes a sixth of the physical causes of mental alienation, and an eighth of the deaths. Dr. Burrows thinks that it is not so frequently a cause of insanity, or of death, in this country as M. Esquirol states with reference to France. When apoplexy is connected with the production of insanity, it is generally congestive or hæmorrhagic; and, in the latter case, is generally followed by paralysis, the mental disorder being complicated with hemiplegia, or with a more partial form of palsy. Apoplexy with effusion of blood generally occurs early in the mental disorder, and commonly in the maniacal form. When apoplexy precedes mania, there is often a great change perceived in the moral and intellectual character for some time before the attack. Dr. Burrows justly remarks, that this change in the character may usher in an apoplectic as well as a maniacal paroxysm; and hence the affinity between sanguineous apoplexy and mania is evident.

179. The sudden deaths, however, which take place in chronic mania, and in confirmed dementia, and in the complication of insanity already noticed, are seldom produced by cerebral hæmorrhage. They were formerly ascribed to *serous* apoplexy; but as I have shown (see Apoplexy, § 115) that the form of this disease, usually imputed to the effusion of serum, depends rather upon exhausted organic nervous power, in connexion with congestion, or interrupted circulation of the vessels of the brain, than upon effusion—which, even when present, is seldom in such quantity as to account for the fatal event—so it may be inferred that sudden deaths in these chronic forms of general insanity are chiefly owing either to congestion or exhaustion of nervous power. The fatal attack either commences with sudden or profound coma, which is soon followed by convulsions; or it begins with convulsions, which are soon succeeded by coma, rapidly terminating in death, the apoplectic or the convulsive state being thus consecutive, or both, in a few instances, being simultaneous. Either of these forms of attack is often immediately consequent upon a paroxysm of furious mania, or of delirious excitement; and, in some cases, a state of acute or furious delirium, or of insane agitation, terminates at once in death, without convulsions or coma—at least, of any appreciable duration—having preceded the fatal event. This termination, which may be viewed as a form of apoplexy, has been noticed by Pinel, Esquirol, Burrows, and others, who have described it as occurring only in old and cachectic cases, and as being preceded by a sudden accession of maniacal or delirious excitement, which soon ceases, and the patient dies, as if from exhaustion of vital energy. On dissection, but little is found in the brain to account for the event, and the body soon passes into putrefaction. These forms of apoplectic attack are identical with those which I have ascribed, in the article Apoplexy, to exhaustion, or loss of the organic nervous energy of the brain—a state formerly noticed by Boerhaave, and designated by him *Apoplexia defectiva*. It is probable, however, that in the cases of insanity, in which the sudden death is consequent upon distinct evidence of general cachexia, the event is caused rather by sudden privation of power in the heart, or by sudden congestion of the lungs, or other affection of these organs, than by loss of the nervous energy of the brain.

180. A state of profound and continued *coma* occurs in the course of a few cases of insanity. It may follow mania; and I have seen it in one instance consequent upon moral insanity. I believe that it takes place chiefly in those states of mental disorder which have been produced by depressing causes. The two cases which I have had an opportunity of observing have been prolonged, and evidently owing to exhaustion of the vital manifestations of the brain. Restoration took place from this state, but the powers of the mind were never, even partially, recovered. The *apoplectic* and *comatose* complications, especially of chronic mania, of dementia, and of fatuity—particularly when terminating quickly in death, or characterized by sudden collapse or exhaustion of nervous power—occur most frequently in winter and during cold weather, and are occasioned chiefly by causes which depress or exhaust the powers of life.

181. *E.* Hysteria, Catalepsy, and Cataleptic Ecstasy also occasionally precede, and occur in the course of insanity. The two latter affections, however, are rarely met with, but have been observed by Haller, Boerhaave, Lieutaud, Tissot, Parry, Burrows, and myself, chiefly, however, as antecedents of insanity. Hysteria is observed most frequently at the commencement of mental disorder; and it sometimes passes into a state of moral or partial insanity, which after a time subsides. Hysteria is often associated with hypochondriasis; and both when thus associated, and when severe and prolonged or habitual, insanity is occasionally consequent upon, and subsequently more or less manifestly complicated with it. It is of the utmost importance, in practice, to recollect the connexion, when females come under treatment. In these cases, the mental disorder, as well as the hysterical affection, proceed from a common source; uterine irritation or disease is propagated to the cerebro-spinal nervous system, and the functions of the brain are consequently more or less disturbed.

182. *F.* Disorder of the Digestive and Assimilating Organs very generally *precede* and

complicate disorders of the mind. I am persuaded that much too little importance is attached to this circumstance, in respect both of the pathology and treatment of insanity. The organic functions are often generally deranged—commonly more or less weakened—long before the mind is affected. Digestion is impaired, although the appetite may be natural or even increased; and the bowels are generally torpid, and require large doses of purgatives to act upon them. They are sometimes irregular, from irritation of the digestive mucous surface having reached a considerable pitch, or from the presence of offending matters. The secreting and assimilating functions of the liver are likewise impaired; the bile is either scanty, or retained in the ducts or gall-bladder, until it acquires irritating and morbid states; and the vital influence of this organ on the venous blood circulating through it is insufficiently exerted. Hence the chyle is imperfectly prepared, and the blood abounds either in unassimilated elements, or in materials which require to be eliminated from it. To these circumstances especially are to be attributed much of the disorder consecutively observed in the functions of the brain, of the lungs, and of the heart; and, at length, many of the organic lesions of these organs, which complicate, and ultimately terminate the more severe cases of mental disease. The general *cachexia* often preceding insanity, and still more manifestly attending it, is the result of the morbid states of the chyle and blood consequent upon deficient organic nervous energy throughout the digestive and assimilative organs. Many of the structural changes, as well as the scorbutic state of the body, which very often take place in the more chronic cases of insanity, proceed from the morbid conditions of the fluids consequent upon this impaired state of nervous power.

183. Broussais, and most of his followers, have attributed the disorder of the digestive organs preceding and attending insanity to *chronic inflammatory irritation of the gastro-intestinal mucous surface*, and have even considered the mental affection to be frequently symptomatic of, or caused by the disorder of this surface. Without disputing the occasional presence of chronic gastro-enteritis, both previously to, and associated with mental derangement, I believe that, when it is present, it is chiefly contingent upon the state of organic nervous influence just contended for, and upon the irritating state of the contents of the alimentary canal, arising out of imperfect digestion, and a morbid condition of the secretions poured into it. This subject, however, will be farther noticed hereafter.

184. *G.* There are *various other diseases* which arise in the course of insanity, or are contingent upon it, and which even cause its fatal termination in many instances. The chief of these are consumption, diseases of the bowels, scurvy, organic lesions of the heart, dropsical effusions, gangrene, &c. These are actually complications, inasmuch as the mental disorder generally proceeds in connexion with them for a longer or shorter period, and as they have little or no influence in terminating the mental disorder otherwise than in death. Some of them, particularly diseases of the lungs and pleura, may suspend it, or cause it to intermit, but they have no farther influence over it of a beneficial kind. They, however, often tend to aggravate it, or to cause the slighter and more partial forms to pass into those more general and severe. I shall notice them farther in the following chapter.

185. IV. Terminations of Insanity.—i. Prognosis. Insanity terminates either in *recovery* or in *death*; but it may be said to terminate otherwise when one variety lapses into another, especially into one of a severer or more complicated form, or when one alternates with another. Although this transition of one state of disease into another closely allied to it cannot be strictly considered as a termination of it yet it, requires notice, as possessing great practical importance. Much of the information upon which opinions are to be formed as to the results of mental disease is furnished by the statistics of lunatic asylums—sources of notorious inaccuracy in this country, especially up to a very late period. Much of this inaccuracy arises from the regulations by which those institutions are governed, from the classes of patients which they receive or reject, and from the periods their inmates are allowed to remain under treatment. Many recent cases, both acute and slight, are treated in private practice, and recover in a short time, which do not come into any account either of the number affected, or of the number cured. The systems of treatment pursued in different asylums, public and private, and in states of individual seclusion, are so diversified—in many instances most inappropriate—in some, calculated to aggravate and perpetuate the malady—in others, altogether inert—in numerous cases, without the least reference to very manifest physical disorder, characterized by obvious symptoms and signs—and in not a few, without regard to intellectual or moral guidance—that numerical results obtained from these sources may flatter those who rejoice in a parade of precise details, without considering the soundness of the data upon which they are calculated, or the fallacies which are involved in them, or the unsound inferences which they encourage and propagate, but can never satisfactorily inform those who look for instruction from unexceptionable, and from, at least, tolerably instructed quarters. In a country where the institutions—public and endowed, as well as private and mercenary—for the greatest and most humiliating of human calamities, are shut against professional instruction—where these institutions, and those to whom their medical management is intrusted, furnish the least possible modicum of professional information—where asylums are made more for the profitable and safe custody of the inmates than for their recovery, what can be hoped from statistical and numerical statements but mystification, if not positive deception? While, therefore, I adduce such information as I can obtain, I give it with due note of its imperfections, that it may not be estimated above its real value. There are, however, some sources—especially those to which most frequent reference is here made—that deserve somewhat more of confidence than should be reposed in many others.*

* On this subject, as well as on many others connected with insanity, much interesting remark will be found in an able analytical article in the 13th No. of the *British and*

186. *A.* THE DURATION of insanity is most various. The disease has subsided, in some cases, within a few days from its commencement; in others, it has continued for twenty, thirty, or even forty years. *Recoveries*, as well as *deaths*, occur at all periods from the commencement of the malady. If neither of these events takes place at a somewhat early period, confirmed insanity generally succeeds, and sooner or later assumes the form of dementia, and sometimes ultimately passes into a state of fatuity. In this case, the malady goes on until it terminates in *death*, which takes place either in its simple or complicated states.

187. *B.* RECOVERY is the result in a large proportion of cases of insanity; but the proportion varies remarkably in the several forms and complications of the malady. It is very important, in respect both of the history and classification of the disease, and the *prognosis*, to determine, as accurately as possible, the number of cures in a given number of cases. But before the general results furnished by the imperfect sources already alluded to, or the estimates made from the reports of lunatic institutions be at all considered, it will be preferable to take a view of the several circumstances which influence the event of the malady, but which vary in character, in combinations, and in their effects, in different countries, climates, places, and asylums. These circumstances are, the particular kind of mental disorder; its causes, predisposing and exciting; its duration, continuance, or recurrence; its existence in a simple or in a complicated state; the physical disease with which it is associated; and the age, sex, constitution, occupation, &c., of the patient.

188. *a.* The *form of the disease* has a marked influence upon its curability. M. ESQUIROL states that a greater proportion of the cases of mania is cured than of any other form of madness, and that dementia is scarcely ever cured; but, of 518 recoveries at Charenton during eight years, the numbers were, 263 cases out of 545 of mania; 251 out of 715 of monomania; and only 4 out of 281 of dementia. But of the aggregate of 1557 cases, there were 274 paralytics, 62 epileptics, and 15 idiots; so that the curable cases were 1205, and of this number upward of two fifths were cured. He farther remarks, that the greater sanability of maniacs, comparatively with monomaniacs, had place chiefly in males; monomania being, from this, more curable in females than in males. The following table will give a more precise idea of the results obtained by M. ESQUIROL at Charenton:

Form of Disease.	Male Cases.	Female Cases.	Total Cases.	Males recovered.	Females recovered.	Total recovered.
Monomania . .	372	343	715	123	128	251
Mania	334	211	545	160	103	263
Dementia and Fatuity . .	227	69	296	1	3	4
General total .	933	623	1556	284	234	518
Deduct incurable cases . .	—	—	351			
	—	—	1205	—	—	518=1 : 2·34

Foreign Quarterly Review, which came before me after a great part of this article was sent to press. It is at least consolatory, that the able author of this paper, and of an excellent work on Insanity, should be placed over the County Asylum.

[Dr. PLINY EARLE has truly observed (*Amer. Jour. Med. Sciences*, vol. v., N. S., p. 348), that the nosological distinctions in regard to mental alienation are, to a certain extent, arbitrary, and the classification of patients agreeably thereto is, in some cases, not only difficult, but absolutely impossible; and that there are those who, at several different periods of their disease, exhibit the specific peculiarities of each of the prominent divisions of the affection. He, however, states that, in a majority of cases, the type is sufficiently evident and constant to admit of accurate classification. In the statistics of the York Retreat, it is stated that the per centage of cures of mania was 53·43; melancholia, 54·88; monomania, 31·25; and dementia, 2·08. At the Massachusetts State Lunatic Hospital at Worcester, of 1359 cases admitted, 1296 are classified, and the number of cures in each division given: mania, 672, of which 438, or 65·18 per cent., were cured or curable; melancholia, 434, and 253, or 58·29 per cent. curable; dementia, 179, and 8 curable; idiots, 11. Dr. WOODWARD rejects monomania as an insufficiently distinctive type to form a species. From the above it appears that, while the melancholiacs were the most curable at York, the maniacs were so at Worcester.]

189. *b.* The *causes* have a manifest influence upon the event in mental disorder; but they are so variously associated in producing their effects, that it is very difficult to advance any precise statement on this topic. Hereditary predisposition, and the more powerful physical and moral causes, especially when combined, must be viewed as unfavourable circumstances. Indeed, all the causes which I have enumerated as especially influential in occasioning dementia may be considered in this light.

[But few definite observations have as yet been made in the United States on this subject. Dr. WOODWARD has reported, that of 210 patients, rendered insane by intemperance, 108 were cured, or 51·43 per cent.; of 101, from false views of religion, 64 were cured, or 63·37 per cent.; of 118, from masturbation, 32 were cured, or 27·12 per cent.; of 38, from epilepsy, 4, or 10·52 per cent.; of 278, from ill health, 182, or 65·47 per cent.; and of 330 cases, where the cause was domestic affliction, 60·60 per cent. was cured. Dr. AWL, of the Ohio Lunatic Hospital, has reported 18 lunatic patients cured out of 25 intemperate cases, being a ratio of 72 per cent.; from religion, 63·90 per cent.; masturbation, 25 per cent.; epilepsy, 10 per cent.; ill health, 48·51 per cent.; domestic affliction, 42·50. The total results are the following:

Causes.	Admitted	Cured.	Per cent.
Intemperance . . .	235	126	53·62
Religious	142	90	63·38
Masturbation . . .	138	37	26·81
Epilepsy	58	6	10·34
Ill health	379	231	60·95
Domestic affliction .	370	217	58·64

Insanity from religious excitement would seem to be the most curable; that arising from ill health the next so, while those from other causes grow less so in the following order, viz., domestic affliction, intemperance, masturbation, and epilepsy. "Of all lunatics," says BALLHOMME, "those whose disease is the offspring of pride, including disappointed ambition, have a character which makes them resist all treat-

ment. They are so easily offended, so irascible and furious, that they become angry with everything which caresses them, and that which caresses them confirms their disease. This is the reason why they are so incurable."—(EARLE.)]

190. *c.* The *age*, *sex*, and *constitution* of the patient are material considerations in forming a prognosis. The most favourable *age* for recovery is between the twentieth and thirtieth year. But few recover after the fiftieth year. M. ESQUIROL states that, of 209 recoveries at Charenton, the greatest number of cases were from the twenty-fifth to the thirtieth, and from the thirtieth to the thirty-fifth year. This is the period of greatest vital energy, when acute mania oftenest occurs. Recoveries diminish progressively from the forty-fifth year. The diminution is more abrupt in females, and more gradual in males. Twenty men, however, recovered after the fiftieth year, in which number were 4 out of 12 lunatics who had exceeded 70; so that advanced age does not preclude hope.

[According to ESQUIROL, the recoveries of those from ten to twenty years of age were equal, through a period of 44 years, to 55·55 per cent. of the admissions, and the proportion for each subsequent decade of life was as follows: 53, 50, 47, 44, 33, 20, 25 per cent. At the York Lunatic Asylum (England) the results were similar. Dr. WOODWARD, however, in his Report for 1841, arrives at a directly opposite result. "It still continues," says he, "to be an interesting fact, deducible from our records, that persons attacked with insanity after forty years of age recover in much greater proportion than those attacked before that age." At the York Retreat, recoveries among women have been more numerous than among men, under nearly all circumstances of form and duration, of disorder and of age. The proportion of cures has been greatest among females, also, at the Worcester Hospital, in patients under twenty-five years of age.]

191. Insanity is, generally speaking, more curable in *women* than *men*. When it is evidently connected with a condition of the natural functions, which is susceptible of change by medical art, or by the efforts of nature, or the progress of age, a hope of cure may be entertained on these grounds. Thus, recoveries have often taken place in females at critical periods. M. ESQUIROL mentions instances of dementia in females which had continued from early youth, and had terminated on the appearance of the catamenia; and others which had commenced at that period, and had recovered when the catamenia ceased. When the disease has followed the suppression of an eruption or of an accustomed discharge, a cure may be hoped for by re-establishing the suppressed evacuation or eruption, or by means which have a similar effect upon the constitution.

192. *d.* The previous *duration* of the disease has a marked influence upon the curability of it. The chance of recovery is very much greater in the early than in the advanced periods. Dr. WILLIS stated that 9 cases out of ten were restored when they had been placed under his care within three months from the commencement of the attack; and Dr. FINCH has declared that 61 out of 69 patients recovered who were received into his asylum within the same period from the appearance of the malady. Dr. BURROWS, in his very excellent work, has reported 221 cures out of 242 recent cases. Dr. PRICHARD remarks, that 7 out of 8, or even a larger proportion of recent cases, have terminated successfully in the Retreat near York. This is as favourable a view of the result in recent attacks as can be entertained; and yet, when we consider that many recoveries from mental disorder take place in private practice without becoming known, and that the great majority of those cases which are admitted into institutions or asylums are either of some duration, or second or third attacks, or have withstood the treatment that had been adopted, it cannot be considered as being much too favourable as respects all very early states of this malady.

193. M. PINEL was the first, or among the first, to direct attention, by a memoir read at the National Institute in 1800, to the degrees of probability there existed of recovery at different periods of insanity. This eminent physician inferred that a greater number of recoveries take place in the first than in any other succeeding month; and that the mean duration of the malady, in cases of recovery, is from five to six months. According, however, to M. TUKE and M. ESQUIROL, the mean duration of these cases is somewhat under one year. I believe that M. PINEL's conclusion is more correct as regards all instances of recovery, and especially as comprising recent cases, many of which are not comprised in the accounts furnished by public institutions; while M. ESQUIROL's inference is applicable chiefly to these and similar institutions. This writer states, that of 2005 female lunatics, 604 were cured during the first year, 497 in the second, 86 in the third, and 41 in seven succeeding years. From the tables furnished by him, and Mr. HITCH, of the Gloucester Lunatic Asylum, to Dr. PRICHARD, as well as from other data, it may be truly inferred that recovery is probable in proportion to the shortness of the duration of the malady. The importance of proper treatment at an early period, and the impropriety of sending a patient hurriedly off to a house of confinement, with no assurance of a proper system of treatment being persevered in, is very evident from these data, as well as from numerous other considerations. A recent writer justly remarks, that cases are not wanting to prove that the mind may recover even after many years have been passed in a state of insanity; and that such cases have sometimes been overlooked or concealed, there is too much reason to suspect. Instances are adduced by MM. BEAUMES, ESQUIROL, and CHAMBEYRON, in which recovery took place after madness had continued for twenty years, or even longer, especially upon the establishment of a natural or of a suppressed discharge, or of suppuration, or some extensive counter-irritation or evacuation. From Mr. HITCH's tables it would appear, not only that the greater number of cures occurred in recent cases, but that, in some, recovery took place in a short time after admission, although the disease had been of long anterior duration. Of five patients, insane for ten years, one was cured in nine months, one in ten months, the

third in a year, and the other two in six months; and one who had been insane forty years was cured in four months. Three other cases recovered after eleven, seventeen, and twenty years. These facts are sufficient to prove that, from the long duration of the disease alone, recovery is not altogether to be despaired of.

[It is now abundantly established that the proportion of cures in insanity, when subjected to early and judicious treatment, is greater than in any other malady equally acute. Drs. G. and S. White state, in the report of their Asylum at Hudson, New-York, that 9 out of 10 cases recover when brought to their institution within three or four months after insanity had developed itself. The Maine Lunatic Hospital reports 52·83 per cent. of cures of recent, and 7·31 per cent. of chronic cases. The Massachusetts State Hospital reports, for a period of eight years, 83·75 per cent. of recent cases cured, and 32·21 per cent. of chronic. The Ohio Asylum gives 69·40 per cent. of the former, and 14·83 of the latter. The Hartford Retreat, during a period of 15 years, from 1824 to 1839, gives a total of 84 per cent. of recent cases cured, and 24·1 of chronic. The Bloomingdale (18 years) gives 76·33 per cent. of recent, and 11·5 of chronic. It is worthy of note that the per cent. of Dr. Burrows's cases, as stated above, was calculated upon the whole number curable, while that of most of the American Asylums is based upon the ratio of those discharged cured, to the number of admissions. Dr. Earle has remarked that, had the last been from the ratio of *cures* to *discharges*, the result would have appeared more favourable. Thus calculated, it would be, for the Ohio Asylum, 3 years, 86·11 on recent, and 33·33 on old cases; for the Marine Asylum, 71 on recent, and 14·62 on old cases. At the Massachusetts Hospital the curables of the recent cases were equal to 90 per cent. Taking the results of the Columbus, Worcester, and Frankford Asylums, we find that out of a total of 1059, admitted during the first year of the disease, 824 were cured; of 346 where the disease has continued from 1 to 2 years, 173 were cured; of 397 who had been deranged from 2 to 5 years, 126 were cured; of 245 who had been labouring under the disease from 5 to 10 years, 39 were cured; of 108 from 10 to 15 years, 8 were cured; of 38 from 15 to 20 years, 2 were cured; and of 30 who had been affected from 20 to 25 years or over, none were cured; giving us the following per centage: under 1 year, 77·95; 1 to 2 years, 50; 2 to 5 years, 31·73; 5 to 10 years, 15·91; 10 to 15 years, 7·40; 15 to 20 years, 5·26.]

194. *e.* The *complications of insanity* very remarkably influence the terminations of it. The association of any of the forms of the disease with general or partial *paralysis*, and of dementia, especially with general palsy in any grade, is a most unfavourable circumstance, recovery hardly ever taking place, as shown above (§ 168), in any of these cases. The complication with *epilepsy*, or *convulsions*, is also most unfavourable. When mania is consequent upon severe attacks of epilepsy, or when the maniacal affection is very violent in the intervals of these attacks, few or no hopes of recovery should be entertained. When, however, convulsions appear during the high excitement of mania, a somewhat more favourable opinion of the event may be formed. The antecedence, or supervention of *apoplexy*, or of *coma*, is a circumstance admitting of as few hopes as the preceding complication. The occurrence of *phthisical symptoms*, or of obstinate *diarrhœa*, in the course of the mental disorder, especially when the latter is not followed by amendment, generally indicates a more or less speedy termination in death.

195. *f.* The *seasons* have a slight influence on the issue of insanity. Mania is more frequently cured in summer and autumn. The month of October presents the greatest number of recoveries; the month of February the fewest. Males are more frequently cured in July and November, females in October and May. Of 518 cures, M. Esquirol found that 92 took place in winter, 123 in spring, 145 in summer, and 158 in autumn.

196. *g. As to the proportional number of recoveries in various countries and places*, great differences are found to exist, depending chiefly upon the restrictions, or the latitude, observed in public institutions as to the admission and retention of patients. Dr. Burrows states that 240 cures were effected, in his practice, in an aggregate of 296 cases of various kinds; 221 recovering out of 242 recent cases, and 19 of 64 old cases, or 81 in 100 of all cases, and 91 in 100 of those which were recent: a proportion much greater than that furnished by any other source, but very nearly agreeing with the statements of Dr. Willis. Dr. Jacobi considers that this high proportion can be explained only on the supposition that many patients were dismissed as cured upon the first appearance of amendment, or before recovery had been fully established. He states that, in the asylum under his management, only 40 cases completely recovered out of 100, and six were alleviated. M. Esquirol states that, of 5360 admissions into French hospitals, 2691 were cured; and in the *Memoirs of the Academy of Medicine* (vol. i., p. 40), he observes that 4968 were cured out of 12,592 admitted into the Salpétrière and Bicêtre, many of whom were idiots, epileptics, and paralytic, and fatuous aged persons. The same writer assigns 5918 recoveries to 16,516 admissions into English lunatic asylums. From this it would appear that the proportion of cures formerly obtained in English institutions for the insane is much less than that furnished by the French hospitals. Dr. Prichard remarks that this is the more remarkable, considering the peculiar regulations of Bethlem and St. Luke's. These hospitals present restrictions unknown elsewhere. They reject all who have been more than a year insane; also those affected by paralysis, epilepsy, or convulsions, idiots, the aged and the infirm, as well as those discharged uncured from other institutions; and all persons who have not recovered at the end of one year are dismissed. Yet, on comparing the reports of these hospitals with those of other institutions where no selection exists, the relative number of recoveries is not found to be so great as might be expected. Dr. Burrows states, on the authority of Stowe, who derived his information from Dr. Tyson, physician to Bethlem Hospital, that, "from 1684 to 1703, 1294 patients were admitted, of whom 890 were cured, which is a proportion of more than two in three. But from 1784 to 1794,

1664 patients were admitted, of whom 574, or rather more than one in three only recovered:" this is remarkable. Dr. Prichard gives, on the authority of Mr. Lawrence, the report of this institution from 1820 to 1833 inclusive; and from that it appears that the total number of admissions were 2445, of whom 1124 were cured, 643 were discharged uncured, 70 at the request of friends, 385 as improper objects, and 99 died. Deducting the 385 subsequently excluded, the 2060 furnished 1124 cures, or considerably more than one half.

197. In the following hospitals, where no selection of cases is made, the proportion of cures is: 43 in 100 in the Strafford Asylum; 42 in 100 in the Wakefield County Asylum; 40 in 100 in the Lancaster County Asylum; and about 48 in 100 in the Gloucester Asylum. The following table, furnished to Dr. Prichard by Mr. Tuke, gives the admissions and the results in the Retreat near York, from 1812 to 1833 inclusive:

Classes of Cases.	Number admitted.	Recovered.	Died.	Removed.	Removed improved.	Remain.
1. Cases of less than three months' duration . . .	63	51	6	1	2	1
2. Cases of more than three, and less than twelve, months' duration . . .	65	28	10	6	3	18
3. Cases of more than twelve months' duration	101	31	15	17	4	34
4. Cases of relapse . . .	105	58	17	13	1	16
Total	334	168	50	37	10	69

Mr. Tuke states that several cases entered as recent were properly old cases; and if these were excluded, together with those connected with diseases speedily terminating life, as consumption and apoplexy, the probability of recovery from insanity, in recent cases, is greater than nine to one. An able reviewer very justly remarks on this statement, which is strongly confirmatory of that long since made by Dr. Burrows, that it is deserving of attention, as the opinion generally entertained, in respect of cases even of recent date, is more unfavourable than ascertained facts should warrant, the desponding view taken of such cases evidently tending to relax the efforts which should be made for the recovery of them.

[The following proportion of cases has been calculated by Dr. Earle (*Am. Jour. Med. Sciences*, 1843), from the annual reports of different American institutions for the insane:

Maine State Asylum, from 1840 to 1841, 135 patients admitted, 34 recovered; 25·18 per cent. of admissions. Massachusetts State Asylum, 1833 to 1841, 9 years, 1359 admitted, 588 cured; 43·33 per cent. Vermont State Asylum, 1837 to 1841, 5 years, 396 admitted, 163 cured; 41·16 per cent. Maryland State Asylum, 1835 to 1840, 5 years, 393 admitted, 135 cured; 34·35 per cent. Ohio State Asylum, 1839 to 1841, 3 years, 343 admitted, 124 cured; 36·15 per cent. Kentucky State Asylum, 1824 to 1840, 16¼ years, 841 admitted. McLean Asylum, Mass., 1818 to 1834, 16 years, 1112 admitted, 403 cured; 35·91 per cent.: 1835 to 1841, 7 years, 891 admitted, 474 cured; 53·19 per cent. Boston City Asylum, 1839 to 1841, 1¼ year, 153 admitted, 19 cured; 12·42 per cent. Hartford Retreat, 1824 to 1841, 17 years, 1068 admitted, 600 cured; 56·17 per cent. Pennsylvania Hospital, 1752 to 1840, 88 years, 4366 admitted, 1493 cured; 34·19 per cent. New York City Hospital, 1808 to 1820, 15 years, 1144 admitted, 509 recovered; 44·48 per cent. Bloomingdale Asylum, 1821 to 1841, 20¼ years, 2598 admitted, 1200 cured; 46·20 per cent. Bellevue Asylum, 1791 to 1821, 30 years, 1553 admitted, 704 cured; 45·33 per cent. Frankford Asylum, from 1817 to 1841, 25 years, 784 admitted, 336 cured; 42·90 per cent. Dr. White's Asylum, Hudson, N. Y., 1830 to 1840, 10½ years, 503 admitted, 230 cured; 45·72 per cent.

Of 120,796 cases of insanity admitted into the different insane hospitals of Europe and this country, it appears, from the calculations of Dr. Earle (*loc. cit.*), that 49,046 were cured, being a proportion of $40\frac{6}{10}$ to the 100. The per centage of cures of the aggregate number of patients in the institutions of each country respectively is as follows: United States, 41·13; England, 39·21; Scotland, 48·82; Ireland, 45·72; France, 36·71; Italy, 50·10; Germany, 30·79; Holland, 38·27. There are in Italy many cases of this disease arising from a peculiar endemic influence: the general curability of these sufficiently accounts for the high per centage of that country.]

198. *C.* The *particular prognosis*, or *the symptoms especially indicating recovery* from insanity, requires a brief consideration.—*a.* A paroxysm of mania may continue a few hours, or days, or weeks, or longer, and then remit or entirely vanish; or it may assume the form of melancholia, and continue or alternate with mania to its termination. It is impossible to say when either form of insanity will subside: the more furious, however, the attack, the shorter, generally, will be its duration, especially in mania. But when a remission of violence is attended by amelioration of other symptoms, it is a favourable sign. If the malady have continued several weeks, and the system is suffering, the disease will prove obstinate, if not dangerous. Insanity terminates favourably more frequently by a visible decline of the symptoms, and a remission or complete intermission, than by critical discharges. To these last, M. Esquirol attaches too great importance, Dr. Burrows too little, in this disease; for, although alvine, hæmorrhagic, urinary, and suppurative discharges, or boils and cutaneous eruptions, do not certainly remove the mental disorder, even when taking place spontaneously, yet they frequently do remove it. Fevers, hydropic effusions, and gout—particularly the last—have also sometimes removed the mental affection. These, however, as well as other diseases, have more frequently been followed by a remission, or, at best, by an intermission only.

199. *b. Remissions*, when thus or otherwise observed, may continue for days, weeks, or longer; but the reason still continues partially deranged, and the sleep disturbed by dreams, or by unpleasant sensations, referrible to the head or sense of sight or hearing; and after a time the disorder resumes its full force.—*Intermissions* are a perfect restoration of the faculties for a time, varying in duration from two or three days, or a month, to several weeks, months, or even years. Sometimes the return of the attack is after regular intervals, or *periodic*; but as often it is irregular. Insanity may

cease after a time, having passed first into a remittent or an intermittent state; or it may disappear, more or less rapidly, and completely, without any return. A gradual and perfect restoration of the faculties, however, takes place in the great majority of cases of recovery, without any recurrence or exacerbation of symptoms constituting the states of disorder just mentioned.

200. *c.* The absence of false perceptions and delusions is a favourable circumstance; but when they continue after the abatement of physical violence, a protracted case may be anticipated. A return of the natural feelings, of the affections, particularly to near relatives, and to former habits, is among the surest indications of recovery. But in all cases, in forming a prognosis, the mental phenomena should be viewed in connexion with the physical symptoms and state of the patient, and with such changes in the economy as have usually been viewed as critical in acute maladies, and particularly those affecting the brain or its membranes—especially the restoration of suppressed discharges, evacuations, and eruptions; or the spontaneous occurrence of these—as the hæmorrhoidal and catamenial fluxes, epistaxis, diarrhœa, furunculi, a regular fit of gout, &c. The utmost caution, however, should be observed in giving an opinion as to the event; but it is preferable to hold out hopes of recovery as long as there is a chance of it, otherwise the efforts to effect it may relax, and the patient consequently suffer. The following inferences are not materially different from those arrived at by Dr. Burrows and M. Esquirol.

201. 1. A cure is probable in proportion to the youth of the patient. 2. It is also probable in a ratio with the recentness of the attack. 3. The chance of recovery is the greatest in first attacks, and diminishes with each subsequent attack, and with the duration of the disease and age of the patient. 4. Mania is cured most frequently; next, melancholia and monomania; and lastly, and the least, dementia and fatuity. 5. Melancholia is difficult of cure in proportion to the degree of depression; a dread of poverty, of poison, and perverted ideas of religion, indicating an obstinate disease. 6. Chronic insanity, whether mania or melancholia, seldom recovers. 7. The prognosis of puerperal mania is favourable. 8. Insanity with a propensity to suicide is not unfavourable, if the patient comes early under treatment, and the disease be recent. 9. Acute dementia is curable; but chronic demency and senile insanity are never entirely cured. 10. Hereditary predisposition protracts, somewhat diminishes the chances of, but does not prevent, a cure: relapses and recurrences are, however, more to be expected where it exists. 11. When the insane are incapable of judging rightly of their own state, a cure becomes difficult. 12. An amendment of personal appearance, attended by an improvement in the mind, is indicative of recovery. 13. When the insane preserve or acquire all their physical functions, and eat and rest well, and present their usual appearance, without recovering their faculties, recovery is hopeless. 14. Insanity caused by excessive study, by the slow operation of moral emotions, or attended by hallucinations, by pride, &c., is seldom cured. 15. Complications with palsy and apoplexy are incurable, and are fatal ultimately; but those with epilepsy, or convulsions, may recover in very rare instances. 16. Men are more liable to relapses than women, one half of all relapses occurring in the first three months after recovery.

202. ii. Of Relapses and Recurrences of Insanity.—Recoveries from insanity are either *complete* or *incomplete*. Of the latter, there are many, who, although perfectly rational, are never capable of returning to the sphere they formerly occupied, or of performing the duties which they previously fulfilled; their faculties having sustained a shock which can never be altogether recovered from. Dr. Prichard considers such cases to be about one tenth of the recoveries. Others remain longer or shorter in such a state of susceptibility that the slightest causes occasion *relapses*; and they preserve their sanity only by continuing to live where no mental agitation or inquietude is likely to befall them, and throw them back into their former state.

203. *a.* A *relapse* may be said to occur when the malady returns while the patient has scarcely, or very recently, recovered, or when he is only in a state of convalescence. It may take place a few weeks, or two or three months after an attack of insanity. The precise time, Dr. Burrows remarks, when a cure may be said to be complete, is assigned with difficulty. Many experience, for weeks, even months, after recovery, uneasy sensations or confusion in the head; and, as long as these are complained of, no confidence can be placed in the stability of the cure. But when these sensations entirely cease, and all the functions are restored, any subsequent access of insanity is, as in other maladies, a *recurrence* of it, and no relapse.

204. Men are said to be less subject to relapses than women; but this is not the case, for many circumstances influence the chance of this event taking place, and to most of those men are more exposed than women. As soon as convalescence commences, the care of the physician and attendants is especially required; for, if imprudent measures be adopted before this period has been succeeded by restored health, a relapse will probably be thereby occasioned. The middle and poorer classes are more apt to relapse than the rich; for the former go from an asylum direct to their misery, and to encounter the exciting causes—probably the same causes which produced their derangement; while the latter may enjoy intermediate measures of precaution. Most of the relapses, as well as recurrences of the disease, proceed from a premature or incautious gratification of habits and indulgences concerned in the production of the primary attack, or from too great mental exertion for the weakened state of the faculties, or from mental excitements or contrarieties.

205. *b.* The probability of a relapse is generally in a ratio with the suddenness of recovery, and is most frequent in mania. Recurrences are most common in melancholia; and, as well as relapses, are very apt to occur when the mind is influenced by religious fears. Relapses or recurrences are announced by nearly the same symptoms as preceded the first seizure; and when warning has been taken by these, and medical aid procured, a return of the mal-

ady is frequently prevented. Indeed, it should always be remembered that, when the mind has been once disordered, a predisposition is thereby created to a return of the malady when subjected to any of the exciting causes. In some constitutions this predisposition or aptitude to a renewal of the complaint is much stronger than in others; and to its greater strength in some persons is partly to be attributed the remittent or intermittent character it frequently assumes; and the periodicity which it often observes, and which is probably owing to an increase of the predisposition by various physical influences recurring at stated periods. Each successive attack increases the morbid tendency to a return of the malady, and shortens the interval between it and that which is to follow; until at length the intervals not only become much shorter, but also more imperfect, and the disorder at last assumes a remittent or a permanent form.

206. *c.* The *proportion of cases* in which insanity is recurrent has been generally overrated, in the opinion of Dr. Prichard. Of 444 recoveries, M. Pinel reckoned 71 cases of relapse and recurrence; but of these 71 cases, 20 patients had experienced several attacks; 16 had left the hospital too soon; 10 came afterward under treatment, and recovered without relapse; 14 had given themselves up to grief and intemperance; and several others were unfavourably circumstanced. M. Esquirol reports 292 recurrences of insanity out of 2804 recoveries, or a little more than one tenth. M. Desportes states that 52 recurrent cases were recognised at the Bicêtre, in 1821, out of 311 admissions, or 17 in 100; and that 66 were received at the Salpêtrière out of 454 admissions, or 15 in 100. M. Georget, however, remarks that there were, among these cases of relapse and recurrence, many who had been discharged in a state of incomplete recovery, as well as a number of drunkards, who came every year to spend some weeks in these hospitals, having been taken there in a state of intoxication.

207. Mr. Hitch has furnished Dr. Prichard with the particulars of 68 readmissions from among 546 admissions. These 68 readmissions occurred in 25 persons only; and of these there were 17 men, 10 of whom were paupers, readmitted forty-nine times; and 8 women, of whom 4 were paupers, who were received nineteen times. Many of those who were readmitted had been either removed uncured by the wishes of friends, or discharged "relieved on trial," their friends having found it necessary to replace them: some returned after an apparently perfect cure. The general inference at which Dr. Prichard has arrived is manifestly correct, that the improbability of a recurrence of insanity increases with the length of time which has elapsed without any sign of renewed disease, and that it is also greater in proportion to the completeness of the recovery. When the energy of the mental faculties is fully restored, relapse and recurrence are much less to be feared than when they remain weak and excitable.

[It has been truly observed, that the liability to recurrence, or relapse, is probably greater in this disease than in most others, inasmuch as a large proportion of patients have the diathesis of insanity, or a predisposition to the affection, either constitutional or hereditary. In puerperal cases, we know that the irritation of future pregnancy is very likely to provoke a return of the affection. In the statistics of the York Retreat, England, it is shown that the liability to recurrence, after the first attack of insanity, is equivalent to at least 50 per cent. of the whole number of cases that recover. Of the patients treated in that institution, the proportion was greater, being 65·6 per cent. At the Pennsylvania Hospital, Blockley, of 176 admissions, 142 were of the first attack, 21 of the second, 4 of the third, three of the fourth, 2 of the fifth, 1 of the sixth, 1 of the seventeenth, 1 of the twentieth, and 1 of the twenty-first. At the Frankford Asylum, of 784 patients, 96 were of the second admission, 28 of the third, 8 of the fourth, 2 of the 5th, 1 of the sixth, and 2 of the tenth. Of the 96 admitted the second time, 51 had been discharged, cured of the first attack. At the time of readmission, 19 had been discharged less than three months, 9 of them cured; 12 from three to six months, 3 of them cured; 16 from six to 12 months, 13 of them cured; 11 from one to 2 years, 8 cured; 10 from two to three years, 4 cured; 9 from three to five years, 5 cured; 16 from five to ten years, 7 cured; and three more than ten years, 2 cured. Of 240 readmissions at Wakefield, 39 were in less than three months after the former discharge; 31 from three to six months; 21 from six to nine months; 23 from nine to twelve months; 51 from one to two years; 34 from two to three years; and 80 from three to ten years.—(Earle.)]

208. iii. Of the Fatal Termination of Insanity.—Although the state of the brain connected with insanity may be incompatible with the due exercise of the mental manifestations, yet it may not so disturb the physical functions as very materially to shorten or endanger life. This is shown both by the duration of insanity in many cases, and by the longevity of lunatics. Instances are adduced by M. Desportes and others of the long continuance of this malady. Among the lunatics at Bicêtre, in 1822, 1 had been there fifty-six years; 3 upward of forty years; 21 more than thirty years; 50 upward of twenty years; 157 more than ten years. Among those in the Salpêtrière, there were 7 cases upward of fifty years; 11 from fifty to sixty; and 17 from forty to fifty. Although many live thus long in a state of insanity, yet the mean duration of existence is shortened by it, and chiefly owing to the following causes, each of which requires a brief consideration: 1. By exhaustion of organic, nervous, or vital energy; 2. By the progress of the morbid state of the brain, associated with the mental disorder, so as seriously to disturb the physical functions; 3. By favouring the development of diseases of several vital organs; and, 4. By the occurrence of accidental disorders which may be masked by the mental disease, or concealed by it until it assumes a serious form. The mental disorder, however, is often *symptomatic* or sympathetic, a consequence of disease more or less latent, of some important abdominal or thoracic viscus, yet seriously affecting the constitution and nervous power; the physical malady being sometimes aggravated, and occasionally suspended for a time, by the sympathetic mental affection, but, nevertheless, terminating

life sooner or later. This topic will be more particularly noticed hereafter.

209. *a. Exhaustion and depression of nervous or vital energy may proceed so far as to fatally terminate the insane state.*—This occurs chiefly in mania, wherein the inordinate excitement of the feelings, the constant agitation of both mind and body, the febrile disturbance of the system, and the continued want of rest and sleep, combine to exhaust the powers of life, and to occasion nervous depression and emaciation. In the majority of cases, the exhaustion either takes place gradually, or does not proceed so far as to endanger life; and the maniacal state passes either into recovery or into dementia: sometimes, however, it is so extreme, or so complete, that the patient never afterward rallies, but rapidly sinks to death. This occurs most frequently during the first two years from the commencement of the malady; and hence the greater number of deaths from mania at this than at any subsequent period. That this result should often follow in cases where the excitement and general perturbation are great, relatively to the amount of vital power, may be assumed *à priori*; and it is in these cases especially that we find the organic lesions insufficient to account either for the mental disorder or for the fatal termination. In extreme cases of melancholia, death may take place from depression, or sinking of nervous and cerebral power; and this state may be aggravated even to a fatal issue by a too depressing or exhausting method of cure, or from want of those means of restoration required by the peculiarities or exigencies of the case.

210. *b. The morbid state of the brain associated with the mental disorder may proceed so far as to seriously, and at last fatally, disturb the physical functions.*—In these cases, the lesions of the brain may vary remarkably in respect of seat, extent, and nature of parts implicated in them; and may commence gradually, and proceed slowly to fatal disorganization, or may take place more or less suddenly, and terminate rapidly. In either case, we can observe only the ultimate and gross results in our examinations of the brain and its appendages after death; but there can be no doubt that these, during their development and increase, give rise to phenomena, several of which have been described when treating of the principal *complications* of insanity (§ 167, *et seq.*), especially to the different forms of paralysis, to epilepsy and convulsions, to apoplexy, and to coma, either of which may terminate life.*

211. *c. The development of serious diseases of vital organs seated in either the thoracic or the abdominal cavity, and even of the system generally, seems to be favoured by insanity;* and it is to these diseases that a fatal termination is often owing. Many consider the occurrence of these diseases accidental, but they are so frequently observed among the insane, relatively to other classes of persons, that something more than chance is concerned in their production. As I believe that insanity—and particularly certain forms of it—is more or less connected with general debility of the organic nervous system, expressed more especially in the brain, so I consider that the functions, and subsequently the structure, of other important organs will suffer during the continuance of it, particularly if any predisposition to disorder in these organs have already existed. And, accordingly, we find that those viscera most obnoxious to disease, especially in weakened states of vital energy, are the most frequently attacked.—*a.* Most writers and observing practitioners have remarked the great number of instances in which the death of insane persons was owing to *tubercular consumption* and inflammations of the pleura. In these cases, the pulmonary disease has generally proceeded in an insidious or latent form, until shortly before the fatal event has taken place. In many, insanity may be viewed as inducing a disposition to disease of the lungs, and as favouring the operation of its exciting causes, which may be more than usually influential and frequent in their operation during mental disorder. Dr. Greding found that 40 out of 100 maniacs, and 20 out of 25 melancholics, laboured under phthisis; and that 74 of 100 maniacs, and 20 out of 24 melancholics, were found to have more or less effusion either in one or both cavities of the thorax. This may be an extreme frequency of these complications, or be owing to local or peculiar causes; but there can be no doubt of their frequency. Insane persons affected by these diseases of the lungs lose their strength, suffer slow or hectic fever, become emaciated, and at last have cough and shortness of breathing, with diarrhœa. In this state, the insane symptoms rather increase than abate, and generally continue until death. In some cases the pulmonary disorder precedes the mental disorder, or accompanies it. This is especially the case with melancholia, as remarked by M. Esquirol, and with hypochondriacal monomania. In these, the impairment of vital power affects both the lungs and the functions of the brain, and sometimes both nearly simultaneously.

* ["The distinguishing features of the paralysis peculiar to the insane are, 1st. Defective action of the muscles of locomotion. This, at first, is generally very slight, amounting to nothing more than an instability of gait, or tottering, or, at most, a sudden yielding of the knees beneath the weight of the body, the patient partly falling, but again recovering himself and pursuing his progress. It afterward increases, and sometimes entirely destroys the ability to stand.

"2d. Defective action of the organs of speech. Words are uttered indistinctly, and, at times, so confusedly as not to be understood. It not unfrequently occurs that, in attempting to speak a particular word, the patient finds it impossible to pronounce any portion of it.

"3d. Exalted ideas of station, riches, and power. Persons affected with the disease generally imagine themselves either as one of the sovereigns of the earth, or as having command of inexhaustible stores of wealth.

"4th. It is generally, if not always, incurable.

"5th. The pathological lesions are, thickening and opacity of the meninges, with serous effusions between and beneath them; their adhesion, by cord-like attachments, to the brain; and a degeneration and discoloration of the cineritious substance of the latter.

"Death comes either very suddenly from cerebral congestion or epileptiform convulsions, or lingers long, until, from a generally depraved condition of the secretions, gangrenous eschars, and sloughing of the flesh from the bones, and sometimes absolute loss of muscular action in nearly all parts of the system, the poor unfortunate patient appears but little more than a motionless mass of corruption.

"It is a remarkable fact, that while this affection is so prevalent in France as to have induced Esquirol to assert that 'one half of the insane die paralytic,' it is almost unknown in this country. Dr. Bell, of the M'Lean Asylum, mentions 'twelve or fifteen well-marked cases' which have been under his care.

"The writer has had seven cases under treatment, neither of which (a fact which is also stated by Dr. Bell in regard to those just mentioned) was cured."—(Earle, in *New-York Jour. Med.*, Nov., 1845, p. 378.)]

212. *β. Diseases of the heart* and great vessels are also often concerned in hastening a fatal issue of insanity. M. Foville states that five out of six bodies display, upon examination after death, some organic disease of the heart and great vessels, particularly hypertrophy of the heart. This is most probably owing, in part, as he supposes, to the violent efforts and agitation of insane patients.

213. *γ.* Although *diseases of the digestive organs* frequently exist previously to the appearance of insanity, and are often more or less concerned in causing it, yet they often do not become objects of attention until after it has fully declared itself, when, from their nature or severity, they obtrude themselves upon the notice. Whether the disorder consist of gastro-intestinal irritation or not at the commencement, it frequently passes into it, and at last terminates in ulceration, originating chiefly in the mucous follicles, or in abrasion of portions of the mucous membrane. At the beginning of the mental disorder, and particularly of melancholia and mania, constipation is both obstinate and of long continuance, the most drastic or active medicines being required to act upon the bowels. But it generally at last gives way, and is followed by, or alternates with, diarrhœa, which sometimes passes into dysentery, and which rapidly exhausts the strength of the patient without abating the mental disorder.

214. *δ.* The *cachexia* already noticed frequently associates itself with other maladies, in causing a fatal termination of insanity, particularly with disease of the alimentary canal, and enlargement, obstruction, torpor, and congestion of the *liver*, and even also of the *spleen*. In many cases, this state of cachexia is evinced by a sallow, lurid, dirty, and scaly state of the skin, and by papular eruptions or discoloured patches. It sometimes proceeds to more obvious disease of the fluids and soft solids; furunculi and carbuncles break out in different parts of the body, and sometimes slough extensively; the gums become spongy and sore, and bleed upon the slightest irritation; livid blotches occasionally appear on the lower extremities, and complete scurvy at last supervenes. In other cases, emaciation, occasionally amounting to marasmus, a cold and clammy state of the general surface, diarrhœa, and colicky pains in the abdomen, take place, either with or without the more obvious indications of scurvy, and the patient sinks from the gradual decay of vital power, and the effects of this decay upon the digestive, the assimilative, and nutritive functions. These cases are most frequently met with in dementia and chronic mania, the mental faculties indicating a failure of the vital manifestations of the brain altogether similar to that of the other important organs of the body.

215. *ε. There are other maladies of more accidental occurrence, which often terminate the life of the lunatic.*—These, as well as the most of those just noticed, may be masked by the mental disease, or entirely concealed by it, until they reach a serious or even dangerous form, or they may not be detected until disclosed by a *post-mortem* examination. The complaints of the patient even are often overlooked and taken for delusions. This is especially the case in hypochondriacal monomania and melancholia. But the truly observing physician will frequently recognise, in the delusions of the insane, bodily disease of a serious nature. Several of the delusions already noticed have been shown to depend upon contingent organic lesion of a vital or important organ. Sufficient proofs of the truth of this have been adduced above (§ 21); and I need not farther allude to this topic than to press the importance of this connexion, and the necessity for carefully ascertaining what connexion may exist between the illusion entertained and visceral lesion. Many of the diseases which may be viewed as accidental only as respects their occurrence in lunatics, may, in some degree, be owing to the physical state of these individuals, inasmuch as they are more frequently attacked by these diseases, and suffer more severely from them than any other class of persons. Fevers and chronic inflammations are often met with among them, the former generally assuming a typhoid character, with predominant cerebral affection, and frequently terminating fatally; the latter often giving rise to effusion, and causing death in consequence.

216. *ε.* The *diagnosis of visceral diseases in lunatics* is remarkably difficult, owing either to the unfounded complaints made by them under the influence of fancied and erroneous sensations, or to the extent to which the mental disorder masks the physical disturbance. Many lunatics labour under severe diseases without evincing them by any expression, because either these diseases do not occasion much suffering, or the disturbed state of their minds prevents the morbid sensation from being perceived. In this latter respect, the diseases of lunatics are more obscure than those of infants, because the latter express their ailments by their cries and attitudes. M. Georget justly remarks, that where we observe a lunatic, who had previously been agitated and furious, become morose and taciturn, and, at the same time, lose his appetite, seek repose, and display a suffering and dejected expression, we ought to examine him carefully, for he is attacked with acute disease. The development of symptoms will soon point out the seat and nature of the malady. But chronic affections are so slow in their approach, and so latent in respect of their symptoms, that they often reach a very advanced stage before their existence is suspected, unless a careful examination had been made before, as well as after their commencement. This is especially the case in regard of diseases of the lungs, heart, pleura, and of the organs of digestion. From this, it is manifest that insane persons should be carefully watched and examined, and that the states of the lungs and heart should be investigated from time to time by percussion and auscultation.

217. *f.* The *rates of mortality* among lunatics have received much attention from M. Esquirol and Mr. Farr; the former of whom states, that the highest rate, for the two sexes, is between the ages of 40 and 50: that of women is greatest between 50 and 60; that of men betwen 40 and 50. A greater number of men than women die insane; and this is partly owing to the greater frequency of the more dangerous complications in the former than in the latter. M. Esquirol concludes, from a comparison of different hospitals, the deaths to be,

in *mania*, 1 in 25; in *monomania*, 1 in 16; in *melancholia*, 1 in 12; and in *dementia*, 1 in 3. He farther states, that a greater number of deaths take place in December, January, and February than in any other three months. Mr. Farr states, that the mortality furnished by Bethlem, St. Luke's, and the asylums at Stafford, York, Lincoln, Gloucester, and Hanwell, amounted to 10·40 out of 100 treated; that the annual mortality among lunatics was 9 per cent.; and that the mean ages of those admitted at Bethlem varied from 36 to 39. That no precise idea can be formed, however, from these data, of the mortality of the insane, is evident, from the fact that two of the principal of these institutions do not admit any but recent cases, and that they do not allow these cases to remain longer than one year. Enough, notwithstanding, is adduced to prove that *insanity remarkably shortens the mean duration of life.*

[At the Massachusetts State Hospital, from 1833 to 1841, inclusive, the mean average age of 99 patients who died was 46·4 years, that of men being 47·2, and that of women 45·6 years. At the Pennsylvania Hospital (Blockley), of 176 patients, in 1841, 48 were more than 50 years old. At the Boston City Asylum, in 1840, of 208, 32 were more than 50, and 2 more than 70; and at the Worcester, Massachusetts, Asylum, during the first 9 years, of 1359 patients, 268 were more than 50. At the Maine Hospital, 1840 to 1841, of 135 admissions, 6 died, or 4·44 per cent. At the Massachusetts Hospital (Worcester), 1833 to 1841, 9 years, of 1359, 109 died, or 7·50 per cent. of admissions. At the Vermont Hospital, at Brattleborough, 1837 to 1841, 5 years, of 396 admissions, 21 died, or 5·32 per cent. At the Virginia Hospital, at Staunton, 1836 to 1841, 5½ years, of 131, 21 died, or 16·00 per cent. (12, in 1840, by dysentery). At the Ohio Asylum, Columbus, 1839 to 1843, 3 years, of 343 admissions, 36 died, or 10·49 per cent. At the Kentucky Hospital, at Lexington, 1824 to 1840, 16½ years, of 841, 337 died, or 40·65 per cent. (43 of Asiatic cholera). At the M'Clean Asylum, Charlestown, Massachusetts, 1818 to 1834, 16 years, of 1122 admissions, 96 died, or 8·55 per cent. South Boston, 1839 to 1841, 1½ years, of 153 admitted, 9 died, or 5·88 per cent. Hartford Retreat, Connecticut, 1824 to 1841, 17 years, of 1068 admitted, 69 died, or 6·45 per cent. Pennsylvania Hospital, Philadelphia, 1752 to 1841, 89 years, of 4366 admitted, 610 died, or 13·97 per cent. of admissions (many of delirium tremens). Ditto (Blockley), 1841, 1 year, of 176 admitted, 9 died, or 5·11 per cent. Bellevue, New-York, 1791 to 1821, 30 years, of 1553, 154 died, or 9·91 per cent. Bloomingdale Asylum, 1821 to 1841, 21 years, of 2598, 240 died, or 9·25 per cent. Frankford, Pennsylvania, 1817 to 1841, 25 years, of 784 admitted, 108 died, or 13·77 per cent. of admissions.—(Earle.)]

218. Considerable difference exists in estimates formed by writers of the numbers of deaths from the prevailing diseases among lunatics. Indeed, no precise data can be furnished on this point; for those who parade numerical data or details in this, as well as in other maladies, by no means satisfy us in what manner those details have been obtained. Numerical results, unless furnished by the ablest and most discriminating observers, and with the utmost accuracy and good faith, may mislead more than instruct; and this is a subject on which it is next to impossible to furnish them with precision. Besides, the comparative prevalence of fatal diseases in lunatics will necessarily vary in different places, with numerous related circumstances and contingencies.* The diseases, also, of the insane are often so complicated that different observers may impute the fatal result to different affections or lesions even in the same cases, although the matter may seem to have been placed beyond dispute by a *post-mortem* examination. Thus, tubercular formations in the lungs and extensive ulcerations in the bowels will often be found in the same case; or disease of the liver, lesions in the brain, and inflammation of the peritoneum, or of the pleura, in another; or changes in the heart, effusions into the cavities, and lesions of some other organ, in a third; and hence different physicians may ascribe death to very distinct organic changes. Some, even, satisfied with the alterations presented by one vital organ, may leave other important viscera either entirely unexplored, or insufficiently investigated, although they may be equally, or even more affected.

219. Notwithstanding these objections, it may be conceded that the most fatal maladies among the insane occur nearly in the following order as to frequency: more or less sudden deaths from apoplexy, coma, and convulsions; pulmonary and pleuritic lesions; nervous, typhoid, adynamic, and putro-adynamic fevers, usually with predominant affection of the brain; general palsy; general cachexia, frequently with colliquative diarrhœa; organic lesions of the liver, bowels, and mesenteric glands, causing marasmus, &c.; exhaustion of vital power without sufficient alteration of structure to account for death; structural change of the heart, &c.; and dropsical effusions into shut cavities, particularly the pleural and pericardiac; mortification, chiefly of parts pressed upon, and of the extremities; organic changes in the stomach and pylorus; chronic peritonitis, generally latent; alterations of the uterus, spleen, and pancreas, &c. Organic lesions of the brain, lungs, heart, and digestive organs are found variously associated, in most cases, upon examination after death; those of one organ predominating over the rest in different cases, and

* [We are also to bear in mind the dissimilarity in the nature of the institutions for the treatment of the insane; some, for example, are public establishments under the direction of municipal governments; others are endowed, and under the care of a board of trustees; others, again, are private institutions. Some receive a large number of cases of delirium tremens, or intemperate persons, while others receive few or none; some receive paupers exclusively, others pauper and pay patients, while a third receives pay patients alone. At Bloomingdale, no application for admission is rejected, whatever may be the state or condition of the patient, curable or incurable, in ordinary physical health, or in *articulo mortis* (*Report for* 1842). At the Hartford and M'Clean asylums, no patient is admitted for a less period than three months; whereas, in most institutions, there is no restriction in regard to time. All these circumstances must necessarily affect the results both of recoveries and deaths, to say nothing of the influence of locality and of prevailing epidemics, or particular types of disease; to these should be added the length of time the asylums have been in operation, as the mortality during the first few years is found to be much less than in subsequent periods, except in those institutions from which the patients are invariably discharged at the end of the year. Much will also depend on the nature of the patients first received. In most instances a very large number of chronic and incurable cases are received on the first opening of an insane hospital, and the ratio of recent cases increases with the lapse of time.]

seldom presenting a due relation to the symptoms or disorders complained of, or manifested during life. Diseases in the abdominal organs, and particularly in the intestinal mucous surface, are among the most frequent morbid associations of insanity, but generally contingent upon it, and not until an advanced period of its progress; although, as will appear in the sequel, they are also important physical causes of it. M. Esquirol observes, that of upward of 600 examinations after death, three eighths die of diseases of the abdomen, two eighths of diseases of the chest, and three eighths of alterations of the brain and membranes. The proportion here assigned to the first class of diseases is probably too high, and especially in respect of this country. A very able writer remarks, that the reports of lunatic asylums partly show that the corporeal ailments under which the patients languish and die are very often overlooked, and are, consequently, not met by proper treatment; and that these establishments are made a kind of show-houses, instead of being hospitals for the complicated diseases which involve the functions of the mind. "We grant," he goes on to state, "that the mental malady may often be but the first sign of that total impairment of the frame which phthisis, or hydrothorax, or scorbutus, or paralysis, or marasmus afterward more plainly declare; but we suspect there are cases in which, if the life of the patient were preserved through some of the maladies supervening on the mental disorder, the mind would be found to be restored, and the malady to be critical. With the present management of lunatic hospitals these conjectures can neither be verified nor refuted. In many of them medical aid is considered to be nearly superfluous; and in some, we are informed that the appointment of physicians in ordinary has been, if not rejected by the governors, at least subjected to grave debate, as if the county asylum were no more than a supplementary county jail."—(*Brit. and For. Med. Rev.*, No. xiii., p. 30.)

[Dr. James Macdonald, late principal of the Bloomingdale Asylum, states (*New-York Journ. of Med.*, vol. i., p. 337), that of 160 insane patients who died in the asylum, the diseases of 117 were as follows: Asthenia, 19; phthisis, 17; delirium tremens, 10; fever, 9; apoplexy, 9; epilepsy, 8; palsy, 8; inflammation and softening of brain, 8; inflammation of bowels, 5; dysentery, 4; suicide, 4; diarrhœa, 3; dropsy, 3; concussion of brain, 2; cholera morbus, 2; cholera Asiatica, 2; strangulation occurring to paralytics while eating, 2; abscess of liver, 1; lumbar abscess, 1; erysipelas, 1; inflammation of lungs, 1; starvation, 1; total, 117. The term *asthenia*, Dr. M. states, is used to designate that state of exhaustion or loss of vital force which follows long continued and excessive mental and nervous excitement, and into which the insane often fall. As shown by the above, more die in this state than by any single disease. If all the diseases of the brain, including apoplexy, palsy, inflammation, &c., be added together, it will be found that a larger number have been destroyed by them than by the diseases of any other system. They amount to 32 in 117 deaths.

Of 102 fatal cases at Worcester, Massachusetts, Dr. Woodward gives the following causes: Marasmus, 24; epilepsy, 14; consumption, 9; apoplexy, 8; suicide, 7; disease of the heart, 6; cholera morbus, 4; mortification of the limbs, 3; hæmorrhage, 3; inflammation of the bowels, 2; disease of the brain, 2; dropsy, 3; diarrhœa, 2; brain fever from intemperance, 2; dysenteric fever, 2; chronic dysentery, 2; lung fever, 2; old age, 1; chronic bronchitis, 1; gastric fever, 1; land scurvy, 1; congestive fever, 1; erysipelas, 1; disease of bladder, 1; total, 102. The term *marasmus*, in the above, is probably nearly equivalent to the term *asthenia*, as employed by Dr. Macdonald. Dr. W. remarks, that there is an erythematic inflammation of the brain, attended with a bloodshot eye, a hot skin, rapid pulse, dry tongue, and muttering delirium, which is often mistaken for insanity; and that if these improper cases were deducted from the list of deaths, it would materially lessen the bills of mortality. Of the 102 deaths, 23 took place within 20 days after admission; 10 of which were recent, and 13 old cases; 13 males and 10 females. The above will convey a very correct idea of the causes of death in insanity in other institutions, as well as those above mentioned. The mean average of age at death, of both sexes, was 46 (males, 47; females, 46).—(*Ninth Annual Report of State Lunatic Hospital, at Worcester*, 1841.)]

220. M. Esquirol gives the following tables of the mortality in insanity, according to the ages:

Bicêtre. No. of *Men* admitted from 1784 to 1794, 2405.		Salpêtrière. No. of *Women* admitted from 1804 to 1814, 2804.	
20 to 30	25	20 to 30	58
30 to 40	176	30 to 40	83
40 to 50	215	40 to 50	143
50 to 60	134	50 to 60	173
60 to 70	90	60 to 70	123
70 and upward	45	70 and upward	210
	685		790

Table of the Mortality at the Salpêtrière during 10 Years.

No. admitted each Year.	1804.	1805.	1806.	1807.	1808.	1809.	1810.	1811.	1812.	1813.	Total.
271	46	21	15	8	1	6	2	1	1	1	102
301	—	48	29	16	7	2	4	1	—	2	109
292	—	—	49	22	9	2	1	4	2	1	90
297	—	—	—	64	25	3	2	2	4	1	101
252	—	—	—	—	35	23	8	1	3	1	71
299	—	—	—	—	—	35	31	7	3	1	81
260	—	—	—	—	—	—	30	22	9	3	64
233	—	—	—	—	—	—	—	26	20	9	55
301	—	—	—	—	—	—	—	—	23	10	33
298	—	—	—	—	—	—	—	—	—	26	26
2804											738
Deaths during this period among those admitted before 1804											52
											790

Of 790 deaths at the Salpêtrière, from 1804 to 1814, 382 occurred in the first year after admission, 227 in the second, and 181 in the seven following years.

221. The table of deaths from insanity, and from the diseases of the brain most nearly allied to insanity (p. 548), is made up from the "*Abstracts of the Causes of Deaths registered in England and Wales from 1st of July to 31st of December, 1837, both inclusive.*" These abstracts, and the remarks accompanying them, by Mr. Farr, are extremely valuable to medical men.

TABLE OF DEATHS FROM INSANITY, AND FROM DISEASES MOST NEARLY ALLIED TO IT, IN ENGLAND AND WALES, *from 1st of July to 31st of December*, 1837, *inclusive*.

NAMES OF PLACES.	AREA in Acres.	POPULATION according to the Census of 1831.	INSANITY.			DELIRIUM TREMENS.			CEPHALITIS.			PARALYSIS.			APOPLEXY.			EPILEPSY.			DISEASE of the BRAIN.		
			Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.
The Metropolis, and parts of Middlesex, Surrey, and Kent	44,810	1,594,890	38	39	77	30	4	34	159	135	294	161	176	337	259	230	489	64	43	107	91	71	162
Manchester and Salford	37,797	236,935	1	1	2	0	0	0	9	14	23	23	17	40	25	6	31	3	4	7	10	8	18
Liverpool and West Derby	38,060	218,233	8	1	9	0	0	0	7	6	13	22	13	35	34	17	51	6	7	13	2	5	7
Leeds	41,520	135,581	1	0	1	1	0	1	11	9	20	1	7	8	13	10	23	0	1	1	16	9	25
Birmingham	2,660	110,914	5	5	10	1	0	1	5	3	8	8	13	21	14	11	25	4	2	6	5	5	10
Part of Middlesex, Hertfordshire, Buckinghamshire, and Bedfordshire	1,323,888	515,893	9	4	13	4	1	5	21	18	39	28	27	55	60	61	121	11	19	30	8	17	25
Kent, part of Surrey, Sussex, Hampshire, and Berkshire	3,861,100	1,351,236	16	14	30	9	0	9	53	37	90	95	107	202	188	168	356	30	32	62	66	35	101
Dorsetshire and Wiltshire	1,407,913	373,797	3	3	6	2	0	2	10	6	16	42	44	86	33	37	70	9	12	21	5	3	8
Devonshire	1,691,572	503,118	3	2	5	4	0	4	21	11	32	39	32	71	61	64	125	12	8	20	14	12	26
Cornwall	866,474	304,785	1	1	2	0	0	0	8	5	13	18	30	48	25	30	55	1	6	7	4	4	8
Somersetshire	987,087	451,252	5	2	7	3	0	3	17	14	31	22	27	49	42	29	71	8	6	14	17	11	28
Essex	928,589	304,315	0	6	6	2	0	2	12	9	21	18	17	35	32	35	67	8	11	19	8	5	13
Norfolk and Suffolk	2,118,867	682,788	7	15	22	2	0	2	21	15	36	39	63	102	58	59	117	11	9	20	11	14	25
Cambridgeshire, Huntingdonshire, and South Lincolnshire	1,295,379	311,714	0	0	0	2	0	2	7	8	15	22	13	35	24	22	46	4	9	13	5	7	12
North Lincolnshire, Rutlandshire, Derbyshire, Nottinghamshire, Leicestershire, and Northamptonshire	3,936,980	1,045,133	5	7	12	5	0	5	18	27	45	65	78	143	96	72	168	20	21	41	33	26	59
Oxfordshire, Gloucestershire, Worcestershire (except Dudley), and Warwickshire (except Birmingham)	2,355,462	977,108	13	8	21	4	0	4	41	33	74	63	83	146	104	87	191	12	21	33	50	32	82
Mining parts of Shropshire, Worcestershire, and Staffordshire	140,798	223,457	2	1	3	0	0	0	9	7	16	9	11	20	11	21	32	3	2	5	5	4	9
Cheshire, Shropshire, and Staffordshire (except mining districts)	2,216,515	721,555	8	12	20	3	3	6	26	11	37	45	51	96	64	60	124	13	19	32	14	14	28
Lancashire (except Liverpool and Manchester), south of Morecambe Bay	1,131,270	905,501	9	6	15	1	0	1	36	22	58	58	50	108	69	44	113	15	14	29	10	6	16
West Riding of Yorkshire (except the northern part thereof, and Leeds)	1,250,530	773,254	4	4	8	4	0	4	26	27	53	33	21	54	40	42	82	12	9	21	18	10	28
City of York, and East Riding of Yorkshire	730,945	199,515	0	2	2	2	0	2	8	4	12	10	13	23	34	28	62	9	12	21	5	3	8
Durham, and the North Riding of Yorkshire, with the remainder of the West Riding (except the mining part)	2,104,736	319,042	1	2	3	4	0	4	12	8	20	23	31	54	41	36	77	7	4	11	9	10	19
The mining parts of Northumberland and Durham	88,708	318,941	1	2	3	0	0	0	20	12	32	57	34	91	40	30	70	0	1	1	10	5	15
Cumberland and Westmoreland, with the remainder of Lancaster and Northumberland	1,590,448	338,273	1	0	1	0	0	0	13	7	20	33	22	55	21	26	47	3	4	7	8	7	15
Wales, Monmouthshire, and Herefordshire		1,016,219	6	1	7	3	1	4	7	6	13	73	72	145	60	39	99	13	16	29	14	3	17
England and Wales	Area in Sq. Miles. 57,805	13,897,187	147	138	285	86	9	95	567	454	1021	987	1052	2039	1447	1264	2711	278	292	570	438	326	764

It is to be hoped that the reports of the register-general will appear annually. Mr. Farr states, that the insane who die in lunatic asylums have often been registered, improperly, under secondary diseases, such as apoplexy and diarrhœa. Under the head of violent deaths are included suicides, accidents, &c.; and it cannot be doubted that the great majority, at least, if not the whole of suicides, are instances of some form or grade or other of insanity.

222. V. Of the Alterations of Structure connected with Insanity.—It is evident, even from what I have already stated, that few diseases are connected with so great a diversity of structural changes as insanity, and there is none which has given rise to so much discussion and difference of opinion as to the nature of this connexion as it has occasioned. It has even attached to itself a very particular interest at present, owing partly to its importance, and partly to the very opposite views entertained respecting it by some of the most experienced of recent writers on mental diseases. But little information was furnished on this subject previously to the almost contemporaneous publication of some cases, with the *post-mortem* appearances, by Morgagni and Meckel. Ballonius, and, long afterward, Bonet, had furnished a few particulars; but these were rather of lesions found in the thorax and abdomen than of changes within the head; and it was not until the investigations of Greding, Marshall, and Haslam appeared that the appearances of the brain in fatal cases of insanity received any degree of attention. More recently, the researches of Pinel, Esquirol, Georget, Bayle, Lallemand, Bouillaud, Neumann, Guislain, Calmeil, and Foville have been most assiduously directed to this interesting subject; still, the results furnished by them are of such a kind as to prove the necessity for farther investigation, carried on independently of preconceived opinions. Although British writers have hitherto contributed but little to this department of medical knowledge, it is to be hoped that those who have the management of public institutions for insanity in their hands will see the advantages which will result contingently even to those connected with themselves—will catch a glance of their own interests prospectively—from the encouragement of researches into the pathology and treatment of the most distressing of all maladies, not merely for the benefit of the few subjects of the maladies to whom they are guardians for a time, but also for the instruction of those to whom the community have to look for aid in these calamities, and, consequently, for the advantage of all classes in society.

223. i. Morbid Appearances observed in the Head.—*A.* The *cranium* seldom presents any change from the healthy *shape*, excepting in epileptic or idiotic lunatics. Greding states that, of 220, only 16 had the forehead contracted, the temples compressed, and the occiput large and expanded. In a few, the head was elongated and compressed laterally. In some, the head was almost round, or of a square shape: these were chiefly epileptic lunatics and idiots. I have observed, in this class, one side of the head higher than the other, and sometimes, also, more prominent, while the other side receded, giving rise to the *diamond-formed obliquity* or deformity of the skull described by me in the article Cranium (§ 9). Of 26 cases, including epileptic lunatics and idiots, Greding observed 2 belonging to these latter with very small and quite circular heads. Of the whole number of cases (220), the skull was unusually thick in 167; this was observed in 78 out of 100 cases of mania, and in 22 out of 30 idiots. In some cases the cranium was remarkably thin. Numerous foramina were observed in the inner table of 115 out of 216 cases; and, in some instances, bony projections arose from this table. Similar changes in the cranial bones were noticed by Neumann and Georget, the latter of whom has inferred hypertrophy of these bones to be still more frequent in lunatics than stated by Greding. The bones of the head have likewise been observed more vascular than natural by Calmeil and others. (See art. Cranium, § 9–12.)

224. *B.* The *membranes of the brain* are frequently altered.—*a.* Greding found the *dura mater* adherent to the cranium in 107 out of 216 cases; in a few instances, of a bluish black colour, thickened, and containing ossific deposites. Similar lesions were observed by M. Georget, who also detected the *arachnoid* sometimes thickened, but smooth, and occasionally presenting, in places, additional lamina of a red or gray colour. The *pia mater* was, according to this pathologist, injected, thickened, and infiltrated with serum, giving it at first the appearance of a gelatinous deposite. Greding found it thickened and opaque in 86 out of 100 cases of mania, and beset with small spongy bodies in 92 out of 100; these bodies being united to the surface of the brain, and in some instances containing ossific matter. M. Calmeil has described these excrescences, granulations, or spongy bodies, to arise or grow from the pia mater, so as sometimes to penetrate the dura mater and cause absorption of the inner bony surface of the cranium: and he has remarked, that infiltrations and thickenings of parts are almost constantly found under these excrescences. The above changes in the membranes, and particularly in the arachnoid, have been recorded also by Haslam, by Guislain, and by M. Bayle. To these alterations, and to effusion of serum between the membranes and in the ventricles, this latter physician ascribes the chief phenomena characterizing and contingent upon insanity.

225. *b. Effusions of serum* between the dura and pia mater were observed by Greding in 120 out of 216 cases of insanity, and in 58 out of 100 maniacs; and between the pia mater and surface of the brain, in 28 out of 100 cases of mania. The lateral ventricles were full of serum in 29 instances, and remarkably distended in 23. They were equally distended in 10 among 24 cases of melancholia. The third ventricle was quite full in 57 out of 100 maniacs, and in 16 out of 24 melancholics. The fourth ventricle was distended to the utmost in 80 out of 100 maniacs, and quite empty only in 3. It was greatly distended in every one of 24 melancholics examined. Dr. Haslam found serum effused between the membranes in 16, and in the lateral ventricles in 18 out of 37 cases. Effusions between the membranes and in the ventricles were met with also by MM. Georget, Guislain, and Bayle, the last of

whom ascribes insanity to inflammatory irritation of the membranes; effusion following upon the inflammation, in his opinion, and occasioning the cessation or diminution of maniacal violence, the great loss of power in the intellectual faculties, and the commencement of general paralysis, owing to the pressure caused by the effusion. According to this view, the progress of dementia, fatuity, and general paralysis indicates a corresponding increase of effusion and of pressure on the brain. Other writers, who differ from M. BAYLE as to the origin and seat of insanity and general paralysis in chronic inflammation of the membranes, and of serous effusion from them, readily admit the great frequency of these lesions. LALLEMAND, CALMEIL, BOUILLAUD, CASAUVIEILH, and FOVILLE have all described similar changes to the above, but have viewed them more in connexion with alterations in other parts, and estimated them differently.

226. *c.* The *choroid plexus* was found in a healthy state by GREDING in 16 cases only out of 216, and thickened and full of hydatids in 96 out of 100 maniacs. M. GEORGET has remarked that the choroid plexus was exsanguineous, and contained hydatidiform vesicles. The *lateral ventricles* were, in some instances, very small, but much more frequently large and distended, as just stated, with serum, which was remarkably clear and limpid. The *convolutions* of the brain were often observed by M. GEORGET separated by an effusion of serum, and the pia mater thickened.

227. *d.* M. FOVILLE states that, in acute cases, the morbid appearances discovered in the meninges were chiefly injection of the pia mater; and that this injection was generally proportioned to the degree of inflammation existing in the cortical substance of the convolutions. The small arteries and veins passing from the membrane and penetrating the gray matter were distended with blood: the arachnoid, in these cases, generally retains its natural aspect. The chronic changes in the membranes, according to this observer, consist, for the most part, in opacity, increased consistence, thickness of the arachnoid, the formation of granulations and false membranes on its surface, and the effusion of serum into the cellular tissue of the pia mater and into the ventricles. The arachnoid is often, in patches or more extensively, of a pearly whiteness. The opacity of this membrane is always attended by thickening, and in the place where the arachnoid and pia mater are naturally contiguous, they are found to be adherent. The opaque patches result from the deposition of albumen upon the arachnoid.

228. *C.* The *substance of the brain* has been more closely examined in cases of insanity, in recent times, than heretofore. Indeed, the progress that has lately been made in the minute anatomy of this organ will necessarily enable the pathologist to recognise many lesions of its structure, which were entirely overlooked in former times. The researches of M. FOVILLE into the state of the brain in persons who have died insane are of great importance, and were carried on by him in the Salpétrière, aided by MM. DELAYE and PINEL GRANDCHAMP, and subsequently in the extensive hospital of St. Yon, near Rouen, which is under his care. The morbid appearances which I proceed to describe as having been observed in the brain, are chiefly the results of his investigations.

229. *a.* The *gray substance of the brain* presents, in the most acute cases, on the removal of the membranes, intense redness of its surface, approaching to that of erysipelas. This is still more marked in the substance of the cineritious tissue itself; and it is more striking in the frontal region than in the temporal and lateral lobes, and in the higher regions than in the posterir parts. In *acute cases* of insanity, M. FOVILLE states that the changes in the gray matter consist of uniform and intense redness of colour, with numerous mottled spots, varying from a bright to a violet red, and bloody points or minute extravasations of blood; of diminished consistence of this structure, coincident mostly with a slightly increased consistence of its surface; and of dilatation or enlargement of its vessels. He has never observed, in these acute cases, adhesions of the membranes to the cortical substance, which are very frequent in chronic cases. To this circumstance he ascribes the curability of recent cases, and the incurability of dementia and chronic cases.

230. In these latter cases the gray or cortical substance becomes much firmer and dense in the superficial part; and this part, owing to its uniformity, constitutes a distinct lamina, smooth externally, but irregular internally; of a lighter colour than usual, and admitting of being torn or peeled off, leaving the remainder of the gray substance red, soft, and mammillated. Sometimes this pale and dense surface, or part of the cortical substance, is rough and granulated, containing small grains of a yellowish white. In conjunction with these, the volume of the convolutions remains natural, or is lessened or atrophied. When it is the latter, linear depressions or irregular pittings exist on the surface of the convolutions; and in the gray substance itself, small yellowish lacunæ, filled with a yellowish serum, are found. These lacunæ are supposed to correspond with, or to be the remains of the minute extravasations observed in acute cases. In other instances, the diminution of volume is a real atrophy of the convolutions, which appear thin and angular, as if pinched up towards their extremities. This change is very frequent in the frontal regions of the hemispheres, and often particularly comprises three or four convolutions in each side of the sagittal suture; a chasm filled with serum, occupying the place left by the absorbed substance. Coexistent with this alteration, is often observed a limited atrophy of the cranium, or a circumscribed disappearance of the diploë, owing to which the external table approaches the inner, leaving a superficial depression. In this atrophy of the convolutions the diminution of substance is confined frequently to the cortical or gray matter; what remains of it being harder than natural, and sometimes presenting, on close examination, a fibrous structure. It is also of a darker colour, and occasionally seems separable into layers, the exterior being pale, and the interior of a rose colour.

231. Softening of the gray substance is also often observed in chronic cases of insanity, extending through its whole thickness, and not

superficial merely. This softening is generally attended by a greater depth of colour, which often approaches to brown, and is frequently so great as to amount almost to liquefaction of this structure. This extreme and general softening of the cortical substance is not necessarily attended by a similar change of the white structure, but is sometimes conjoined with a hardened state of that structure. In these cases the gray may be separated from the white substance by the effusion of water. These more extreme alterations are found, especially in the worst cases of dementia, complicated with paralysis and marasmus. MM. Foville and Calmeil have met with instances of this description, in which limited portions of the gray substance had disappeared previously to death. The gray structure in other parts of the brain does not present the same changes as have now been described as taking place in the convolutions, but generally exhibits alterations similar to those of the medullary or white substance. The cortical structure, however, of the cornu ammonis is in some cases softened, and in others hardened.

232. *b.* The *white or fibrous structure of the brain* is often found altered in colour, density, and texture. It is frequently injected, and its vessels more or less enlarged, exhibiting numerous bloody points on sections of it. In other cases it has a mottled appearance, of a deep red or violet hue, owing, as M. Foville believes, to a finer injection of its vessels, as shown by the magnifying glass. These injections of the white structure do not always coincide with similar injections of the gray substance. Sometimes the fibrous or white structure is splendidly white, and generally, at the same time, increased in density, or hardened. This induration occasionally amounts to an almost fibro-cartilaginous state. In two or three cases I have observed the increase of density nearly to resemble the white kind of caoutchouc. The hardened fibrous structure, however, may not be remarkably white; it is sometimes of a yellowish, or of a grayish or leaden tinge. M. Foville accounts for the induration of this structure by supposing that the cerebral fibres have contracted adhesions to each other, so as to render their separation impossible. According to him, the fibrous mass of the hemispheres consists of several distinct layers or planes of fibres applied one upon the other, and connected by very fine cellular tissue. These planes are easily separable in the healthy state, but become inseparable in the course of mania. The occurrence of tubercles and tumours in the brain is considered by him as accidental when met with in cases of insanity.

233. *c.* The *cerebellum* undergoes alterations similar to those observed in the brain, but much more rarely.

234. *d.* The *nerves* sometimes present changes corresponding with disorders of sensation and perception. M. Foville has found the optic nerves hardened, and otherwise altered in persons troubled with hallucinations of sight.

235. *e.* The *morbid appearances found in cases of insanity complicated with general paralysis* have especially engaged the attention of M. Calmeil. In this association of mental and of physical disease, it is very difficult to determine, as Dr. Prichard remarks, what alterations are connected with either morbid state; and certainly many of the changes met with by M. Calmeil in these paralytic cases are similar to those regarded by various writers as connected with insanity, without reference to its association with paralysis. This pathologist concludes that general paralysis is not dependant upon compression of the brain by serous effusion, as supposed by M. Bayle, but upon the disease of the encephalon, which gives rise to the effusion, and chiefly on inflammation, of which the thickenings, and lesions, and vascular turgescence of the pia mater, and the peculiar condition of the gray structure, afford sufficient evidence. M. Calmeil has succinctly enumerated the changes observed by him in the encephalon, in this class of complicated cases, nearly as follows: Injection and absorption of the bony structure; injections of the dura mater, separation of its fibres; effusion of serum into the cavity of the arachnoid; false membranes, organized or without organization; cysts filled with blood in its two laminæ; simple hæmorrhages in the arachnoid; œdema of the meninges; injections and thickenings of the membranes; vegetations of the pia mater, and development of its vessels; adhesions between the pia mater and the convolutions; disappearance of the gray substance; softening, induration, and discoloration of this substance; hardening and injection of the white or fibrous structure; redness and tumefaction of the ventricular villosities; serous effusion into the ventricles; apoplectic cysts; erosions of the convolutions; softening of the brain, or of the spinal marrow. These changes are so various, and so far from uniform in occurrence, that they cannot satisfactorily explain the results imputed to them. M. Calmeil considers them all to be proofs of a chronic inflammation of the brain; and in this, as well as in his descriptions of many of the alterations, he agrees with M. Foville. This latter writer states that, in lunatics affected with general paralysis, he found the induration of the fibrous structure of the hemispheres, described above (§ 232), wanting only in two cases, and in these the cerebral nerves, the annular protuberance, and the medulla oblongata presented extreme hardness. He states farther, that this induration of the fibrous structure of the brain has been found in old men whose voluntary movements have become uncertain or vacillating; but it has never been seen in lunatics whose muscular powers had remained unimpaired. I have observed induration of the spinal cord, with effusion of serum between the membranes, and other changes, in two cases of general incomplete paralysis unattended by insanity, both patients, however, having become delirious shortly before death.

236. The brain has occasionally been so infiltrated with serum that the fluid has flowed from the surface of the incisions. This infiltration has been so remarkable in a few instances as to constitute a true œdema of the brain. Much more rarely, as observed both by Esquirol and by myself, a multitude of pores or small cavities, containing a limpid serum, have been found in the substance of the brain, a section of the part thus changed resembling that of a porous cheese. In these cases the brain may be also somewhat indurated and

changed in colour. It is by no means determined, as some suppose, that these pores or cavities are the sequelæ of vascular extravasations; it is more probable that they are the consequences of softening, the pores being left by the removal of the molecules of the cerebral substance, which have lost their vital cohesion to the rest of the structure, and filled by a serous effusion.

237. *f.* The *inferences which may be drawn from these researches* deserve a brief notice. It will be seen from these that M. Foville ascribes the morbid appearances to inflammation, and in this agrees with Calmeil and others. But it will be remarked by many, and not the less by those who may have read the article Inflammation in this work, that this term has been applied, and possibly is applicable, to several lesions, attended by changes in the state of capillary and vascular action, each differing more or less from the other, and accompanied with different, or even opposite conditions of organic nervous or vital power; and that, although these lesions may be apparently quite similar, and be followed by nearly the same results, in different cases or persons, yet may the state of vital power or manifestation, in respect not only of the functions of the brain, but also of the whole economy, differ remarkably in each particular instance. It is well known that the lesions constituting, as well as consequent upon several kinds of phlegmasiæ—upon phlogosis, or simple sthenic inflammation, and upon erysipelas and other forms of spreading or asthenic phlegmasia—nearly resemble each other; but they are attended by very different constitutional disorder; and this is independently of grades of activity or intensity of action. Besides, something should be attributed, in many cases, to the influence of the moral causes, and to the consequent mental excitement upon the cerebral circulation, with reference not only to prolonged erethism or excitement of the capillaries distributed to the organ of mind, but also to constitutional or vital power, and to the various maladies of which the cerebral affection may be only a symptom, or sympathetic disorder. We know that, in other organs or parts, a prolonged irritation or excitement of their capillaries by agents which excite chiefly the nerves supplying them, will so determine the blood to them, and so enlarge and develop their vessels, as to give rise to appearances which nearly resemble the consequences of inflammation. We find, moreover, that the most violent forms of mania and of delirium, and the most fatal when not judiciously treated, are actually those in which inflammatory appearances are the least evinced, or in which states opposite to inflammatory really exist. We find, also, lesions in the brain—whether inflammatory or not—equally extensive with those observed in the most general and complicated cases of insanity, and without any disorder of mind having existed during life. Can we, therefore, legitimately impute insanity, in all cases, to these lesions? or may not these lesions be just as legitimately imputed to the insanity? There is very probably a connexion between them in most cases; but neither the exact nature of the connexion, nor the intimate relations and source of the morbid alterations observed, have been yet fully ascertained. This is, however, no reason wherefore we should altogether reject the conclusions at which able and experienced observers have arrived, until we obtain others upon which more implicit reliance can be placed.

238. The morbid changes in the encephalon, M. Foville infers to be the results of inflammation; intense, diffused, and general redness; in many cases, tumefaction; and, in passing to the chronic state, the formation of adhesions between the cortical substance of the convolutions and the contiguous membrane: besides this, adhesion of the different planes or layers of the cerebral substance to each other in a certain number of cases. As the different traces of inflammation are more constant in the brain than in the membranes, M. Foville concludes that the essential change connected with insanity takes place in the brain, and that alterations of the membranes are only accidentally connected with it. Among the morbid appearances in the brain, lesions of the gray structure are considered by him as the most constant in connexion with the mental disorder. Although M. Calmeil was inclined to ascribe loss of muscular power to disease of this structure, M. Foville contends that the facts upon which he founds this inference do not warrant this conclusion. In all the cases of general paralysis he has examined, there was, besides the change in the gray structure, some alteration, either hardening, serous infiltration, or softening of the white or fibrous substance; and in most cases, in addition to these, there were adhesions of the principal planes of the cerebral substance to each other.

239. From the circumstance of the gray substance of the hemispheres being found in a state of disorganization or atrophy, in cases where intellect was abolished, and the fibrous structure being natural where muscular power was unaffected, as well as from the fact of lesions or wasting of this latter structure being observed where voluntary motion was lost or affected, M. Foville infers that the function of the gray structure of the brain is essentially connected with the intellectual operations, and that the office of the white or fibrous part is subservient to muscular action; and, consequently, that, 1st, morbid changes in the former part are directly connected with intellectual derangement; and, 2dly, those in the latter portion are connected with disorders of the motive powers. He, however, admits that in some affections of the maniacal class succeeding the action of debilitating causes—as in the puerperal state—nothing has been discovered in the brain more striking than its extreme and general paleness; and that, although some mottled appearances of a light red or rose colour are met with, these changes are too slight to be considered as idiopathic. M. Foville is therefore induced to consider this form of mental disorder to be symptomatic of some deep-seated disease of the uterus or abdomen. But, unfortunately for his argument, of several cases of puerperal mania which I have treated, I have not met with one that did present any serious or deep-seated disease in these parts. There can be little doubt, however, that the contradictory evidence given by different observers of the appearances of the brain in cases of insan-

ity is partly accounted for, as remarked by an able writer, by the existence of cases in which the affection of the brain is merely functional and sympathetic, the primary disease being in some other organ, especially in some of the abdominal viscera.

240. The evidence of those who believe that insanity, although often connected with organic lesions of the brain, especially in protracted and extreme cases, does not necessarily depend upon them, requires some notice. Here the experience of M. Esquirol attaches to itself great importance. He remarks, that the bodies of lunatics offer numerous varieties as to the situation, number, and kind of morbid appearances, and that the lesions of the encephalon are neither in relation to the disorders of the mind, nor to the maladies complicated with it. Some lunatics, whose mental and bodily disease indicated extensive organic lesions, have presented slight changes in the brain; while others, whose symptoms had been less severe, have been subjects of great and numerous alterations. But even in the most protracted cases of insanity no organic changes whatever have been traced, either in the brain or in its membranes. He goes on to state, "that pathological anatomy is yet silent as to the seat of madness, and that it has not yet been demonstrated what is the precise alteration in the encephalon which gives rise to this disease." The various states of the brain, compatible with integrity of the mental faculties, have never been satisfactorily investigated, and probably will never be accurately ascertained; and it is by no means easy to distinguish with sufficient precision the appearances resulting from or belonging to concomitant maladies from those which belong to the mental affection. M. Esquirol observes, that organic lesions of the brain are declared by symptoms distinct from the mental disorder; that chronic inflammation produces compression and paralysis, and paralysis results from cerebral hæmorrhage; and that tubercles, tumours, and softening of the brain have their peculiar symptoms, which cannot be confounded with mental alienation. Moreover, the sudden and instantaneous relief experienced in some cases of madness is not to be forgotten; nor the fact that every part of the brain has been found altered, suppurated, destroyed, without chronic lesion of the understanding.

241. The maniacal form of insanity is rarely fatal, owing to any lesion of the brain; but from fever, phthisis, and other associated maladies, or from sudden exhaustion of the sensibility or nervous power necessary to life. In a case which terminated in this latter manner, no lesion was observed in the brain after death; and in a young woman, accidentally killed in recent and furious mania, the brain and its membranes were likewise devoid of change. When a case is watched during life, M. Esquirol thinks that the period at which the organic lesion of the brain commences may be known by the symptoms. When mania has existed long, he is of opinion that the weakness of the last days of life disposes to local inflammations. Upon the whole, he concludes that, notwithstanding the labours of MM. Foville, Calmeil, Bayle, and Guislain, the organic reason of mental derangement is still undeclared. "Thirty years ago," he adds, "I should have written willingly on the pathological cause of insanity: I will not now attempt so difficult a labour—such are the uncertainty and contradictions in the results of the examination of the bodies of lunatics after death up to this day. But modern researches permit us to hope for more positive, clear, and satisfactory notions." In another place, he admits that a difference in the results of researches may arise from the greater care with which the brain is now dissected, and the slightest changes observed, and that, at earlier periods of the investigation into the pathological anatomy of insanity, an account was kept only of obvious alterations.

242. Respecting this matter, M. Guislain appears to steer a middle course in his more recent work on Insanity. After various details, he concludes that, in the greatest number of organic lesions of the brain, a moral origin and functional state of disorder, without alteration of structure, first exists; and that, when such alterations are present, they consist chiefly of whatever causes pressure of the brain, as effusion of serum, or of blood, lymph, or the formation of a false membrane; or of constriction of the organ by its membranes, which, in their state of engorgement, incarcerate or strangulate, in some respects, the hemispheres; or of softening or other disorganization, to an extent that is incompatible with the due exercise of the mental manifestations. He adds, that *induration* of the brain has been often observed by him, especially in the parieties of the lateral ventricles, and in the rachidian bulb, or upper portion of the medulla oblongata; that epileptic convulsions frequently attend it; that convulsions are often also caused by organic lesions of the membranes, and of the cineritious structure, but not constantly either by these, or by induration; and that they may occur even without any visible change of tissue. He concludes, that absence of organic alterations of the brain is indicated by the full possession of muscular action and motion, and that the existence of them is evinced by lesion of muscular motion and of sensibility—that simple disorder or excitement of the mental faculties, without dementia or palsy, exists independently of softening or compression of the brain; and that dementia or extinction of the intellectual powers may depend, 1st. Upon sanguineous engorgement of the brain; 2dly. Upon effusion of serum between the membranes or in the ventricles; 3dly. Upon extravasation of blood between the membranes or in the substance of the brain; 4thly. Upon softening of this organ; 5thly. On atrophy of it; 6thly. On induration of it; and, 7thly. Upon exhaustion of its vital influence.

243. ii. Alterations in the Thoracic Viscera.—*A.* The *lungs* are diseased in a very large proportion of the cases of insanity which terminate fatally. The proportion has been differently estimated by the writers already noticed. M. Georget declares that he has found organic changes in the lungs in at least three fourths of the cases which he had examined, and phthisis to have been the cause of death in more than half the lunatics in Salpétrière. He describes the pulmonary disease as always chronic, and often so obscure as not to be de-

tected until the body is inspected. In these cases, the patient neither coughs nor expectorates, and he makes no complaint: he wastes, gets weak; looseness or constipation succeeds; he dies: these changes take place slowly. Yet, notwithstanding the absence of cough and expectoration, excavations are found in the lungs after death. But instances of latent phthisis occur independently of insanity. When, however, both maladies are associated, the latter is more frequently sympathetic, or dependant upon the constitutional disturbance caused by the pulmonary disease, than is generally supposed; and it then sometimes does not appear until the softened and absorbed tubercular matter has contaminated the circulation, and thereby disturbed the functions of the brain. I have observed in persons predisposed to insanity, as well as in others, that, when tubercles are developed in the lungs, and when softening and ulceration follow without any communication having been made with a bronchus, the progress of the disease is generally latent. The tubercular softened matter undergoes changes during its retention; causes thickening or condensation of the parietes of the cavity containing it, even while the cavity continues to enlarge, and, if it be not evacuated by the bronchi, neither cough nor expectoration will be present. But the constitutional disturbance caused by the accumulated matter, as well as by the organic lesion of the part containing it, and still more by the absorption of a portion of it into the circulation, will so disturb the organic nervous functions, as to occasion, first, functional disorder, and consecutively even organic lesion of such organs as may be most prone to disease from either an original or an acquired predisposition.

244. *B.* The *heart* is often changed in structure in fatal cases of lunacy. Indeed, all the lesions of which this organ is susceptible have been found in the bodies of the insane; but hypertrophy, passive dilatation, and softening of the parietes of the cavities, seem to be the most frequent. The proportion of cases in which organic alterations of the heart have been found has been differently estimated by writers. Romberg (Nasse's *Archiv. f. Med. Erfahr.*, 1817) believed that five out of seven bodies present lesions of this organ; and M. Foville considered that five out of six display alterations either of it or of the great vessels.

245. iii. Alterations in the Abdominal Viscera.—*A.* The *digestive mucous surface* very frequently presents evidence of inflammatory action, especially as respects certain of the consequences of this state. M. S. Pinel met with inflammatory appearances in this situation in 51 out of 269 bodies of lunatics; and of these there were only 13 of disease of the other abdominal viscera. These appearances have been also observed in a number of cases by Prost, Percival, and Guislain. The frequency of displacements of the *colon*, first insisted upon by Esquirol, and especially with reference to melancholia, has already been attended to (§ 119); and has been remarked also by Bergman, Muller, Annesley, and Guislain. In most of the cases described by Esquirol, the displaced colon presented none of the consequences of inflammation. In some of the instances observed by Percival and Bergman, the colon was contracted, or more or less reduced in caliber through a great part of its length; in others, it was in parts dilated and contracted, as well as displaced. M. Guislain attributes both the displacement and the contractions to inflammatory action; the latter most probably arises from this cause; but the former cannot always thus be accounted for. From the few instances which I have had an opportunity of observing, and from the history of many of those which I have seen recorded, it seems probable that most of the changes observed in the colon have been consequent upon asthenic inflammatory irritation, with diarrhœa, and occasionally with a dysenteric or an irregular action of the bowels, which had existed at some time or other during the course of the mental disorder, and especially at a late period of its progress. Dr. Percival (*Dublin Hospital Rep.*, vol. i., p. 144) observes, "that, on the dissection of cases of insanity which have terminated fatally from chronic diarrhœa, the intestines generally exhibit an extensive mass of disease. The mucous membrane is inflamed, thickened, and partially eroded, and the area of the canal diminished, often considerably, in the lower intestines." The mesenteric glands are often found more or less enlarged and indurated. In addition to these changes, hæmorrhoidal tumours and fistula in ano are not rarely met with in dissections.

246. *B.* Although much importance was formerly attached to disorders of the *liver* in causing insanity, yet the researches of recent writers do not tend to confirm the frequency of this connexion. Esquirol, S. Pinel, Guislain, and Foville found comparatively few cases which presented organic changes in the liver and biliary apparatus. It is probable that lesions of the liver, in connexion with insanity, are more frequent in this country than in France, when we consider the influence of the abuse of ardent spirits in causing both insanity and liver diseases. In a case attended by Dr. Sutherland and myself, at the time of writing this, the liver is greatly enlarged The frequency, indeed, of biliary disorder in the insane cannot be doubted; and the occasional association of organic lesions of the biliary organs with mental disorder will be allowed. The chief doubt, in cases where these organs present alterations, will be as to the nature of the connexion; for it will be admitted that disease of the liver will sometimes affect the functions of the brain sympathetically, and that disease of the brain will exert a similar sympathetic influence upon the functions of the liver; and hence the priority of affection of either of these organs will not readily be ascertained.

247. *C.* Alterations of the *gall-bladder*, *calculi* in this viscus or in the hepatic ducts, lesions of the *peritoneum* and *omentum*, of the *mesentery* and *mesenteric glands*, of the *pancreas* and *spleen*, of the *kidneys*, and of the *uterus* and *ovaria*, have been severally found in the bodies of the insane, by Bonet, Schulze, Marcard, Oberteuffer, Piderit, Jones, Percival, Powell, Stark, and others; but these have probably been accidental lesions, although they may, in a few instances, have had some influence in causing mental disorder, particularly in persons otherwise disposed to it, by affecting the or-

ganic nervous energy in general, and especially that portion actuating the brain.

248. VI. Causes of Insanity.—Few subjects are of greater importance than a just recognition of the numerous causes of insanity—of their individual and combined modes of operation—of the influence they exert in various forms of succession—and of the progressive changes they induce before the effect upon the mind is fully developed. And the importance of the matter is not limited to its bearing upon the treatment of the malady, but is even still greater in respect of prophylactic measures, and of rational plans of mental hygiene. In discussing this subject, I shall consider, *first*, the predisposing causes, or the numerous circumstances which render the mind more susceptible of or prone to disorder than in its natural and healthy state; and, *secondly*, those causes which more immediately produce or excite the disorder. And it must not be overlooked, that while the individual influences comprised under the former class are often variously associated in creating a susceptibility or proneness to mental disorder, the occasions or causes belonging to the latter class frequently act, also, in conjunction, or in immediate succession.

249. i. The Predisposing Causes are the most important objects of study, particularly in respect of their bearing upon hygienic and prophylactic measures. The prevention of so terrible an infliction as insanity is, must be even of more importance than its cure, since the person who has once been insane seldom wholly regains his former social position, but is regarded with more or less suspicion, and a union with him is avoided by prudent families. The discussion of this class of causes assumes, moreover, increasing interest and importance, when we consider that many of the circumstances comprised by it are of more frequent occurrence now than formerly, and are more influential in exhausting, weakening, and dissipating the mental powers in the present state of society than in former epochs of civilization; and that several of them may be even viewed as altogether arising out of existing social relations.

250. *A. Constitutional predisposition* is among the most predisposing causes of insanity. It may arise, *first*, from a certain conformation, temperament, or physical and mental constitution, derived from the parents; or, *secondly*, from an original predisposition or conformation, independently of disease in any of the parents; or, *thirdly*, from a state of constitution gradually acquired, or arising out of the continued operation of causes which deteriorate or otherwise change the organic nervous and vital powers, and consecutively the digestive, assimilative, and effective functions. In the *first* of these modes the predisposition is transmitted from the parents; in the *second* and *third*, it is generated *de novo*, and subsequently admits of transmission to the offspring, although not so certainly as in the first case.

251. *a. Hereditary predisposition.*—M. Esquirol states—and the circumstance is confirmed by the observation of others—that persons born before their parents had become insane are less liable to mental disorder than those born after it has manifested itself; and he farther observes, that the morbid tendency, or the actual disease, where it is transmitted hereditarily, is apt to show itself in different individuals of a family at a particular period of life. Instances illustrative of this latter circumstance have been adduced by him, and by Dr. Burrows, MM. Falret, Georget, and others. The hereditary predisposition to insanity, M. Esquirol observes, is not more surprising than the predispositions to gout, phthisis, or other diseases. It may be traced from infancy; and it even explains a number of caprices and irregularities which, at a very early period, ought to put parents on their guard against the approach of insanity, and to guide them in the education of their children. In such cases, the education should tend to render the body robust, and to give tone to the nervous system. The constitution of the offspring should be changed as much as possible, by placing them in circumstances different from those which surround them, or which have influenced the constitutions of the parents.

252. In some instances one particular form of insanity is transmitted; either dementia, mania, melancholia, or states of mental disorder followed by suicide, being thus observed in the same family. The particular variety of insanity evidently depends upon the temperament, which, with the predisposition to this disease, is derived from the parents. Not only the same form of mental disorder, but also the same physical disease complicating it, or terminating it, are apt to appear in the same family, more generally, or even exclusively; yet there are frequent exceptions to this rule. Where an hereditary disposition exists, different grades of the disorder, rather than different forms of it, are commonly observed—in one, merely various eccentricities; in another, partial disorder of the moral powers; in a third, disorder of the understanding; and, in a fourth, mania, dementia, &c. In families, also, in which insanity is hereditary, there is occasionally observed a greater tendency to diseases of the nervous system than in other families, as, to epilepsy, chorea, convulsions, palsy, &c. Dr. Prichard justly believes that a constitutional tendency existing hereditarily, or arising in the other modes about to be pointed out, is more important, in respect of the frequent occurrence of insanity, than all the other causes taken together. It cannot be said, with propriety, alone to give rise to mental disease, without any exciting occasion; but, if it be very strong, mental disorder will follow the operation of ordinary or very slight causes.

253. Dr. Burrows remarks, that Esquirol assigns only 152, out of 264 cases, in his private practice, to this cause, but that an hereditary predisposition existed in six sevenths of the whole of his own patients. The most exempt from this taint were those whose mental disorder had a sympathetic origin; as in puerperal mania. Out of 57 cases of this latter affection, he could trace an hereditary taint in only about one half; but where it existed, the disorder was more apt to return. Dr. Burrows considers that this cause is more common in the higher than in the lower classes, as the former most frequently marry in their own rank, or even in their own families; and that wherever the system of clanship, or family con-

nexion, has been most strictly preserved, there it most prevails. Examples of this are said to have been numerous in the old Highland families of Scotland; and BOETHIUS mentions some very stringent measures which they adopted to preserve from hereditary maladies, or, rather, to prevent the procreation of those who might be tainted by them. That hereditary influence is less common in the lower classes than in the higher, is shown by Sir W. ELLIS's report of the Middlesex Lunatic Asylum. There only 214 cases, in which the disease was inherited, were ascertained, out of 1380 patients admitted; and for 125 of these cases no other cause of the malady than this could be assigned. It has been supposed that numerous instances of insanity occur among the Jews, from the circumstance of their having kept themselves more free than all other races, and for a longer time, from intermarriage with strangers. I believe that mental disorders are frequent among them; but other causes may contribute to the frequency. Dr. BURROWS states that the youngest insane patients he ever had belonged to a family of this race, and that in it he has observed the father and mother and six of their children insane. He farther remarks, that insanity is very prevalent among Quakers, who usually intermarry in their own fraternity.

254. It may be presumed that when an hereditary predisposition to insanity exists in both sides of a family, the risk to the offspring will be much greater than where it is in one side only; and that when this latter is the case, the child who bears a very marked resemblance, in constitution and mental character, to the parent exempt from hereditary taint will be most likely to escape the mental disorder; and the hereditary disposition will fail of being perpetuated by him, unless re-enforced by a similar taint, by marriage. But the child that most resembles the tainted parent will be the most liable to experience, and to propagate, the mental malady.

255. There are two points respecting which opinions are often required from physicians, namely, whether or not a person born of parents who have never themselves been insane, but who, one or the other, is descended from a family thus afflicted, may propagate the malady to his offspring? and whether or not a child born before insanity had appeared in either parent is as liable to become insane as one born after the malady was developed? The *first* question, Dr. BURROWS believes, should be answered in the affirmative, because he has met with insane persons neither of whose immediate parents had themselves been insane, but some of the progenitors, or an uncle or aunt, on one side or other, had been so afflicted. I have known cases where the nearest progenitors to the patients, who had been disordered in mind, were grand-aunts or grand-uncles. The *second* question has been partly answered above (§ 251) by M. ESQUIROL. But Dr. BURROWS considers that a child born, either before or after the accession of insanity in the parent, provided that parent's progenitors or relations of blood had been insane, is liable to the malady; but that, if the insanity of the parent were adventitious, and not hereditary, the child born before mental disorder had appeared will not have it by inheritance: how far a child born after the occurrence of adventitious insanity is liable to mental disorder, is decided with difficulty. This writer believes that, whether it be adventitious or hereditary, once occurring, the morbid diathesis is thereby stamped, or generated.

256. *b.* The offspring may possess a *connate predisposition* to insanity, although neither of the parents, nor of the grandparents, nor any member of their families, had been the subject of it. BURTON long since remarked, upon the authority of the older medical writers, that the offspring procreated of parents when they were far advanced in age are more subject than others to melancholy madness. There can be no doubt, that whatever produces enervation or debility in the parents will occasion a certain amount of predisposition in their children to nervous affections and to mental disorder; and I believe that habitual drunkenness, or the abuse of spirituous liquors, by either parent, and especially by the mother, during gestation and lactation, causes numerous diseases in the offspring, and more particularly disorders of the functions of the brain and nervous system in general. It also is very probable that the children of persons who have been weakened by premature or unnatural sexual indulgences and vices, or who are gouty, hypochondriacal, hysterical, or otherwise debilitated, will be more susceptible of the operation of the exciting causes than the offspring of those who are constitutionally robust and healthy. M. ESQUIROL affirms, that many facts have been observed by him proving that a strong predisposition to madness has arisen from fright or terror sustained by the mother during pregnancy, and that marked cases of this kind occurred during the French revolutions.

257. It has been long and generally supposed that marriages within a confined circle, as between cousin-germans, have the effect of impairing both the mental and constitutional powers of the offspring. The opinion seems well founded, and is undoubtedly just, if the breeding in-and-in be continued for two or more generations. The children of such families often die in infancy or early youth; are frequently scrofulous, and are liable to hydrocephalic and convulsive diseases; and, if they grow up, are frail in body and imbecile in mind, or predisposed to mental disorder. It is doubtful how far the scrofulous diathesis may dispose to insanity, but I believe that it has a very considerable influence.

258. *c.* That there may be not only, 1st, *an hereditary*, and, 2dly, *a connate*, but, also, 3dly, *an acquired predisposition of constitution* to insanity, I firmly believe. This last state is quite independent of the two former, and of temperament or diathesis, and is generally the result of the operation of debilitating causes during infancy, childhood, and the periods of puberty and early adult age. Indeed, many of the moral and physical exciting causes may have this effect when acting in a slight but continued or constant manner. But there can be no doubt that early indulgences; a tender, sensual, and luxurious education; vicious modes of early instruction; masturbation, and premature or vicious sexual indulgences; exhausting pleasures, and inordinate mental and physical excitements, relatively to the states of nervous and constitu-

tional energy; and various other causes, which debilitate the frame, increase the general sensibility, and augment the susceptibility of the brain and nervous system, will often develop, to a greater or less extent, a predisposition to insanity, which may be appropriately termed acquired.

259. It has generally been supposed, and poets have sung, that a great genius is closely allied to insanity. This is most erroneous. Persons with a too active and ill-regulated imagination are predisposed to mental disorder; but those who possess powerful intellects, and a vast range of powers and of intelligence, are much less disposed to it than others; and if they have become insane, the causes have been of an energetic kind, and overwhelming from their activity or association.

260. *B. Temperaments*, &c.—Persons of the melancholic temperament are more liable to the melancholic states of insanity than others; those of the nervous temperament, to mania, dementia, and monomania; and those of the sanguine, or sanguineo-nervous, or irritable temperaments, are attacked more frequently with mania than with any other form of mental disorder. M. Esquirol observes that, when persons of the lymphatic or phlegmatic temperaments, or of a pale, exsanguineous habit of body, are affected with mania or monomania, dementia or incoherency is more liable to supervene in them than in others. This form of insanity is also likely to follow in persons of a full habit of body, with a thick head and short neck. Mental disease pursues a somewhat different course in persons of different temperaments. Choleric or warm constitutions, or those with black hair and eyes, and vigorous frames, become violently maniacal, but experience a shorter disorder, and more frequently terminating in a marked crisis than others. Individuals of a fair, pale complexion, with light hair, fall more readily into chronic mental disease; the dark-haired are liable to become gloomy monomaniacs; red-haired lunatics are disposed to violence, and are treacherous and dangerous. He gives the following table of the general appearances of a number of lunatics:

External habit of body	Of the medium fulness of habit	122
	Thin or emaciated	60
	Fat	6
Height	Tall	102
	Short	19
The eyes	Chestnut or brown	102
	Blue and light	98
	Black	17
The hair	Chestnut	118
	Fair or flaxen	39
	Gray or white (aged)	36
	Black	31

261. *C.* The *form of the head in lunatics* has attracted the attention of Greding, Pinel, Georget, Gall, Spurzheim, and others. M. Pinel believed that there are certain peculiarities in the shape of the skull, frequently observed in the insane, and particularly in cases of dementia and idiotcy. The two most prevalent forms which he specifies, are, 1st, a laterally compressed shape of the head, giving a very long diameter from the occiput to the forehead; 2dly, a short and almost spheroidal form—the above diameter being shorter than usual. He could not, however, detect any mental conditions corresponding with these opposite shapes. M. Georget states the result of the examination of upward of 500 heads in the collection of M. Esquirol. One half of these presented nothing remarkable, being regular and well formed. The other half were more or less peculiar in the form and appearance of the skull, and in the thickness, density, and organization of the bones composing it. Some skulls were unequally developed, one side being more arched and larger than the other, especially the right. Others were somewhat oblique, one side of the head being too forward, and the other much behind. I have seen instances where these two malformations were conjoined. M. Georget found some skulls in this large collection, in which the antero-posterior diameter was not more extended than the lateral: in these, the cavity was much elevated, especially in the posterior part. The cavities of the base of the skull presented likewise inequalities: those of one side were sometimes larger than those of the other. Persons who have contracted heads, particularly as now described, not only are more liable to insanity than those whose heads are well formed, but lapse more readily into a state of dementia or fatuity, and are consequently less curable than others. It is chiefly in these hopeless forms of general insanity that these irregularities of the form of the head are observed. In *idiots*, as I shall show hereafter, these malformations are still more remarkable.

262. *D. Sex.*—The ancients, and especially Cælius Aurelianus, supposed that insanity occurred more frequently in males than in females. Recent investigations, however, have shown this not to be generally the case in modern times. Dr. Prichard quotes M. Esquirol as stating the proportion of insane females in France, to insane males, to be 14 to 11. M. Voisin considers the proportion as 13 to 10. In all Italy, the proportion is different, it being about 5·65 males to 5·00 females. M. Guislain states, that in Holland and Belgium the number of lunatic females to males is as 34 to 29. Dr. Prichard assigns the proportion in Great Britain and Ireland, of male to female lunatics, as 13 to 12; and observes that, in England, the number of insane men, compared with that of women, is more considerable than in Scotland and Ireland; and this excess on the side of the males is greater, according to Dr. Burrows, in the higher than in the lower classes of society. M. Esquirol confirms this observation in respect of France; and farther states that, in the North of Europe—in Germany, Denmark, Norway, and Russia—the proportion of male to female lunatics is as 3 to 2. Dr. Jacobi furnishes nearly the same results in regard of Prussia. In the United States of North America, the number of insane males is stated to be much greater than that of female lunatics. In the States of New-York, Pennsylvania, and Connecticut, the proportion of the former to the latter is nearly 2 to 1. In summing up the results of his inquiries obtained from various parts of the civilized world, M. Esquirol finds that the general proportion of insane males to females is about 37 to 38.*

263. The occurrence of insanity among females is partly owing to the nature and vices

* [From 1821 to 1836 inclusive, there were admitted into the Bloomingdale Asylum, New-York, 1346 males, and 691 females; at Worcester, from 1833 to 1841, there were 710 males admitted, and 649 females.]

of their education; to their greater sensibility and keener feelings; to the restraints imposed upon their desires and emotions; to the crosses, chagrins, and disappointments to which they are liable; to reading romances and novels, and thereby exciting the imagination, without improving the reasoning powers; to the addiction to music, and the want of salutary and invigorating occupations; and to the life of celibacy they are often doomed to lead. These, and various other moral causes about to be noticed, contribute remarkably to the production of insanity among females.

264. The physical causes also operate energetically in producing insanity among this sex; but they are chiefly disorders of the sexual organs. Irritation of the uterus, or of the nerves supplying it, and its appendages; suppression, retention, or inordinate flow of the menses; and various organic lesions of these parts, have a very marked influence, sympathetically, upon the functions of the brain. Many of the moral causes, and emotions of mind, have but little influence, until they have first disordered the functions of the womb; and as soon as this organ is disordered, it reacts upon the brain, and heightens the effects of the moral emotions. In such cases, as well as in many others common to both sexes, the moral causes are often insufficient to induce the mental disorder, until they have first occasioned physical disturbance in some organ; which disturbance, from its sympathetic influence upon the brain, becomes an additional cause of the disorder. Females, however, are often so circumstanced as to experience very serious disorder of the circulation of the brain, from energetic mental emotions occasioning an immediate effect upon the manifestations of this organ, before any disorder can appear elsewhere; and in some cases the consequent disorder is produced almost simultaneously in both the brain and the functions or state of the uterus. We observe this especially in the puerperal states, and, still more particularly, soon after delivery.

265. M. Esquirol remarks, that females become insane at an earlier period of life, are more liable to lapse into dementia, and are more disposed to religious insanity and to erotic delirium than males; and that all varieties of insanity, in them, are generally complicated with hysteria. Males, on the other hand, are more liable to mania and violence; they are more dangerous, and more difficult to restrain: women are more noisy; cry, and talk more; are more dissembling, and less readily confide in those about them.

266. *E. Age.*—Insanity, in the forms which have been described, is rarely observed before the age of puberty. Imbecility and idiotism are always observed in childhood; but the instances in which any form of true insanity has occurred at any epoch before puberty are very few. They have, however, been recorded by J. Frank, Dr. Haslam, M. Fodéré, M. Esquirol, Dr. Prichard, and one case occurred in my own practice, and that was caused by fright. Two cases mentioned by M. Esquirol proceeded from the same cause. He met with one case of melancholia complicated with marasmus in a child eleven years of age, remarkable for his large head and mental precocity. Instances, however, more frequently occur of children becoming melancholic, and even delirious, from jealousy and envy, than is generally supposed. They sometimes are thus affected, although often only temporarily, by seeing the attentions of those to whom they are much attached bestowed upon others, and by being outstripped in obtaining distinctions at school.

267. After fifteen years of age, insanity ceases to be a rare occurrence. About the period of puberty, in females, or when the catamenia are about to be established, melancholia and mania occasionally appear, and especially if the growth be rapid, and the catamenia are retained, suppressed, insufficient, difficult, painful, or irregular. In these cases, and still more so at a later period, hysteria is generally attendant upon the mental disorder. During the first few years after puberty, in the male, mania and melancholia not infrequently occur; the former generally from the excitement of sexual desires, the latter from masturbation or venereal excesses. M. Esquirol remarks, that mania, in all its forms of excitement, appears chiefly in early life; melancholia, in middle age; and dementia in the advanced epochs of existence. In youth, insanity assumes an acute and violent course, and often terminates by a remarkable crisis; in middle age, it is more prone to become chronic, and is oftener complicated with disorder of the abdominal viscera, but is sometimes resolved by hæmorrhage from the hæmorrhoidal vessels, or by diarrhœa. At an advanced age, it is apt to pass into dementia, and to be complicated with paralysis, apoplexy, &c., and recovery is much less to be expected. However, dementia may occur in the young, and very aged persons may be attacked by mania, and recover from it; but these are only exceptions from the rule just stated.

268. The *ages* at which insanity most frequently appears, are, that between 30 and 40; next, that from 20 to 30, and from 40 to 60. M. Esquirol, however, states, that the maximum number of admissions of cases of insanity take place from 30 to 35 years of age; that each five years, from 20 to 35, give nearly the same number; that the admissions of males are more numerous from 25 to 30, and those of females, from 35 to 40; that the periods from 30 to 35 follow thereafter, for the men, and from 40 to 45 for the women; and that the admission of males from 20 to 25 years of age occupy the third rank of frequency, while those of females hold only the sixth rank. From this it follows that insanity is most frequent at an earlier age in men than in women. M. Esquirol farther states, that the wealthy classes are much earlier attacked—or, rather, are affected in greater numbers at an early age—than the laborious. M. Georget adduces the following calculation of the ages of insane persons on admission into several institutions in England and France:

From 10 to 20 years of age . .	365
20 to 30	1106
30 to 40	1416
40 to 50	861
50 to 60	461
60 to 70	174
70 and upward	35
	4409

269. Yet, although a greater number become insane from 30 to 40 than at any other age,

still the number may not be really greater, relatively to the proportion of persons in society of farther advanced ages; and hence, 174 instances of the malady occurring in persons aged between 60 and 70, may actually show a greater prevalence of it at that age than 1406 cases appearing between 30 and 40 years of age. That this, however, is not the case—and that a greater number, relatively to the proportion of persons existing in the community at that age, actually become insane between 30 and 40 years—is proved by the number of persons surviving out of each 1000 at successive periods of life. In this country, 410, out of each 1000 born, will reach 30; and 345 will reach 39; but 220 will reach 60, and 140 will attain 70; and if the mean number of those between 30 and 40 thus be 376, and that of those between 60 and 70 be 146, it will be at once manifest that the number of instances of the invasion of insanity is, relatively to the proportion of persons between 30 and 40 years of age, actually greater at that period.

270. M. Esquirol, however, believes that a proportionably increased frequency of mental disorder, with the advance of age, really does obtain, although the predisposition, thus arising from advancing age, increases in an irregular manner. The increased number of insane persons, he adds, compared with the population of that age, is very striking between 50 and 55 years. From 70 to 75, and from this age to 80, it becomes enormous, owing to the frequency of senile dementia. This is very probably correct; but it must not be overlooked that a very large proportion of the cases of hereditary insanity occurs between 30 and 40, or even earlier; and it is admitted that these cases constitute the great majority.

[Dr. Woodward gives the following as the ages of patients when admitted at Worcester: Under 20 years, 79; from 20 to 30 years, 356; 30 to 40, 383; 40 to 50, 275; 50 to 60, 144; 60 to 70, 88; 70 to 80, 35; over 80, 1. Of these, 715 were single, and 508 married; 88 widows, and 48 widowers.]

271. *F. Education.*—There are few causes which more powerfully predispose to insanity than erroneous education and moral discipline in early age.—*a.* Too great indulgence in childhood, and previously to, as well as during puberty, and a want of moral discipline then and up to manhood, with neglect of that education which inculcates, and, indeed, enforces proper principles of feeling and action, are undoubtedly among the most deeply laid foundations of insanity. Persons thus brought up have their temper, emotions, and moral affections so little under command—are so subject to ebullitions of passion, to caprices, or violent and fugitive emotions—are so liable to act from momentary feeling and impulse—as to acquire a disposition of mind, or moral character, not only most unamiable in itself, but also most prone to marked disorder, when subjected to its more immediately productive causes.

272. *b.* The premature and overstrained exertion of the mental powers is another most important cause of predisposition. In the higher and middle classes of society, the mind is excited much beyond its powers; and the child, being required to perform too much, with its imperfectly developed faculties, experiences, as a consequence of such premature excitement, increased vascular action in the brain and its membranes, at a period of life most disposed to vascular disorder in this organ; and the foundation is thus laid for chronic disorder, and especially for chronic inflammatory action of that part of the nervous system with which the manifestations of mind are most intimately allied. The quantity, as well as the diversity and range of mental exertion, now required from both sexes at a too early epoch of childhood, and during the period which elapses from mere infancy to puberty, while both mind and body are only in an early stage of formation, must necessarily prove injurious, both mentally and physically—and especially to those who are either delicately constituted, or tainted by any hereditary disposition to insanity. Therefore, when this disposition exists, not only should premature and overstrained mental exertion be avoided, but also should the feelings, the passions, and the actions be subjected to strict discipline—to a discipline not too harsh or rigid, but rational and consistent. The mind ought to be formed under a kind restraint, and imbued with correct principles, and with a due sense of moral and religious responsibility. In the present day, too much attention is paid to an early cultivation of intellect, and to the mere acquisition of knowledge of facts and phenomena, to the neglect of the education of the moral affections, and of just principles of feeling and of acting. The great ends of education, as now conducted, are, as respects the one sex, the attainment of that knowledge and of that range of information which may enable its possessor most successfully to compete in the general scramble for wealth, for advancement in society, or even for existence; and, as regards the softer sex, the possession of such accomplishments, and the acquisition of so wide and so superficial a range of ideas, in a very limited period of time, as may strike or captivate, or may be more readily and generally made available in society, and thus become the current coin of the mind in conversation. These objects are pursued in education in a manner but too well calculated to overstrain the early intellect, to exhaust the feeble mind, and to derange the hereditarily predisposed. The mind is engorged with food, not of the most wholesome or digestible quality, beyond its powers of healthy digestion and due assimilation, and even before these powers are fully evolved; and hence but too frequently follow disorders, varied in extent and intensity, of its most important and effective manifestations or functions.

273. *G. Climate and Seasons.*—*a.* It is very doubtful what degree of predisposition can be ascribed to climate and seasons, especially as most of the differences in the numbers of the insane in different *climates* may be attributed to various moral and physical circumstances not necessarily dependant upon climate. In warm climates, and even in Turkey, and other Mohammedan countries beyond the tropics, and in hot climates, where the minds of the population are under the sway of the Romish and Greek churches, insanity is much less frequent than in temperate and highly civilized countries. M. Esquirol, in accounting for the greater prevalence of insanity in temperate climates, attributes too much importance to

sudden alterations or vicissitudes of temperature. The greater frequency of the malady in these climates is plainly attributable to other causes than this. I believe, however, that a predisposition to insanity, and particularly to connate and puerile imbecility, and to dementia, is to some extent generated by marshy or miasmatous places, particularly in low districts subject to inundations, and in low valleys placed deep between precipitous mountains. There the mind and body are checked or weakened in the course of development, and the latter early becomes the subject of diseases which impair its vigour and farther weaken the powers of mind.

274. *b.* The *seasons*, according to M. Esquirol, have some influence in causing insanity; but probably more as exciting than as predisposing causes. High ranges of temperature seem to have considerable influence in causing or in determining the character or form of the disorder, and particularly mania, or the higher states of the malady. M. Esquirol has given a table of the admissions into the *Salpétrière*, during each month, for nine years, according to which it would appear that the lowest number was admitted in January; and that the admissions increased progressively from March till July, when they reached the maximum. They then progressively decreased till October. From this month to March they varied somewhat in number, but not so much as to excite speculation.

275. *H. Professions, Employments, &c.—a.* The frequency or infrequency of insanity among persons pursuing certain professions or employments is obviously to be referred to the several circumstances more immediately connected with these employments; but most of these circumstances will be more fully considered hereafter. The learned professions certainly furnish fewer cases of insanity, relatively to the numbers exercising them, than any other class of persons in the middle ranks of the community. This, probably, is owing to the education for the professions, in early life, being such as tends more than any other to develop, and to strengthen, the judging and reasoning powers, without exciting the imagination, or prematurely involving the feelings and passions. Some exceptions, however, may be found among young divines, who, from enthusiasm or anxiety respecting the state of their minds, have become partially or altogether insane; but such cases are comparatively rare among the soberly and regularly educated.

276. *b.* I believe that insanity is most prevalent among artists, musicians, and actors, relatively to the number of persons pursuing these occupations. This frequency obviously depends upon a great variety of circumstances, many of which will be found among the moral causes of this malady. In the present day—for it was not so formerly, and in the palmy days of Italian art — few artists receive an education, in early life, calculated to develop, or to strengthen the intellectual and reasoning powers. The imagination is early and almost exclusively exercised; and many of the instinctive moral affections of mind (see note, § 66), which exert so powerful an influence upon mental sanity, are so often brought into inordinate action, without the due control of sound judgment and strict principle, that first partial, and ultimately general insanity is the more liable to appear. Besides, artists, in the wide acceptation of the word, are liable, in the exercise of their art, to sustained excitement, not merely of the imagination, but also of the feelings and passions—to a certain tension of the mind—tending to exhaust, and at length to disorder the intellectual powers. There are few classes, moreover, who entertain more extravagant ideas of their own merits than those to whom I now refer; and who, consequently, are more liable to jealousy, envy, disappointments, and wounded self-love. Poets and literary men are liable to the same imputations, entertain the same ideas of themselves, and of others, as those who may be classed under the general denomination of artists; but, in general, their education is sounder, and better calculated to strengthen the reasoning or controlling powers of mind. In all, the sedentary occupations, the insufficient exercise in the open air, and the irregularities of living, or the alternations of abstinence and dissipation, aid the moral causes of the malady in this class of the community.

277. *c.* It must necessarily follow that insanity will vary in frequency in different professions and employments, with the degree in which they respectively call into exercise those moral emotions or causes, on the one hand, and the physical circumstances on the other, on which this malady has been found more especially to depend. Next to artists, in the liability to mental disorder, may be ranked, according to the tables of M. Esquirol, merchants and traders, and military men. This may be expected, especially if brokers or speculators in the funds or share markets are included under this head: and, indeed, merchants, traders, manufacturers, and speculators, or gamblers in all kinds of securities or pseudo-securities, have, in recent times, so entirely fallen within the same category; and are, from the governor or director of the most powerful corporate bodies in the world, down to the very humblest adventurer in a bubble company, so generally and completely subjected, from the nature of their engagements—from the epidemic scramble after gain at all hazards—to alternate excitement and depression — to elated expectations and painful anxieties—to hopes and fears—to fortunate anticipations and humiliating disappointments; and have the prospects of being, or are, in fact, one day as rich as Crœsus, and the next even poorer than the meanest slave — that the mind, which probably has never been strong, nor duly strengthened by wholesome education, and by the early inculcation of sound principles of feeling and acting, at last experiences, and manifests the shock, in some one of the various forms of insanity. Shall the medical philosopher—contemplating the present state of society, seeing these things, and knowing the circumstantiality with which insane acts and crimes are published, commented upon, and rendered interesting to vulgar tastes and minds —be surprised at the existing prevalence of insanity, and one of its most common results, suicide? The weak, the injudiciously tutored, and the pampered mind, after a career of ill-deserved prosperity — a prosperity often as iniquitously enjoyed as unjustly earned—not infrequently experiences a reverse, which it is

incapable of enduring without more or less of mental disorder; but the reverse is commonly attended by circumstances involving also many confiding and innocent persons; and thus more than one sustains a shock before which reason is shaken or entirely overthrown.

278. *I. Previous attacks of insanity, or other diseases of the brain*, greatly increase the susceptibility of mental disorder. Although recovery from insanity often takes place without any subsequent manifestation of mental disease, and although even repeated attacks have been sustained, and a complete and permanent restoration has occurred nevertheless; yet much more frequently madness leaves the person, who has once been its subject, much more prone to a return of it. In many cases, the patient continues, for a long period after recovery has apparently been established, more irritable and excitable than previously to the attack: he is irascible; very susceptible of impressions; and less capable of application to business, or of mental exertion. After every successive attack, this change in temper and character becomes more manifest, until the disease assumes a remittent, and ultimately a continued form; a state of permanent incoherency or imbecility ultimately supervening.

279. Inflammations of the brain or of its membranes, frequent attacks of epilepsy, apoplectic and paralytic seizures, and fevers with predominant affection of the brain, often predispose to mental disorder. Indeed, these maladies are not infrequently both attended and followed by delirium, or some form or other of insanity, which generally disappears in a few days, or, at most, weeks after the primary malady has evinced signs of amendment, or after recovery from it has taken place. When either of these cerebral diseases are thus complicated, the danger of the recurrence of a temporary, or a severe, or even a permanent attack of insanity, or of a return of the primary disease, attended by a more complete overthrow of the mental powers, is much heightened. This is especially the case in respect of epilepsy, particularly when slight partial paralysis with mental disorder follows the fit. In such cases, incoherency, imbecility, and, ultimately, fatuity, often successively appear. In some instances, where the epileptic paroxysm is attended by violent mania, which subsides in a few days afterward, the mental derangement gradually becomes permanent, and either supersedes the epilepsy, or continues complicated with it. When insanity is thus caused by epilepsy, sullenness, sudden irascibility, with a disposition to commit the most atrocious acts, and various manifestations of moral disorder, often characterize the malady.

280. ii. The Exciting or Productive Causes.—Certain of the causes which have been already considered may, from their nature or intensity, give rise to insanity, without the aid of any exciting occasion, or, at least, of any so marked as to attract the notice of the patient's friends. On the other hand, many of the causes about to be noticed, either from their slight but often combined action, or from their continued influence, actually predispose to, rather than excite insanity; or they affect so slowly and imperceptibly the mental powers, as well as the bodily functions, without giving rise to any sudden or manifest shock of the mind, as to change the character or constitution of both, and thereby fit or prepare them for the injurious impression of causes which would otherwise have been entirely innocuous. The exciting causes have been very commonly divided into *moral* and *physical*; and under these heads have been also comprised, by some of the best writers, the causes already considered, as creating a predisposition to mental disorder. And when the circumstances just alluded to, respecting the operation of these causes, are considered, there can be but little fault found with this arrangement. Some authors have differed as to the comparative influence of *moral* and *physical* causes in occasioning this malady. But the difference has arisen chiefly from the more extended signification assigned to the latter term by some, and from their having comprised under it various important causes kept entirely apart by others, and especially the greatest of all causes, hereditary predisposition. Leaving this, therefore, out of the arrangement, or, rather, considering it separately, there can be no doubt of the influence of the moral causes, in the production of insanity, being much greater than that of the physical. Still the matter is not so satisfactorily solved, especially by referring to statistical tables, as may be imagined. For, although it may have appeared, from the information received, that the malady was produced by some moral cause; yet there may have existed at the time, or closely upon it, some physical disorder, and especially some functional disturbance of the digestive, assimilative, and excreting organs, or a morbid susceptibility of the nervous system, or both, without the existence of which the moral affection may have been quite inoperative. Agreeing, however, with Heinroth, Pinel, Georget, Guislain, Prichard, and others, as to the great and predominant influence of moral over physical causes in the production of insanity; still, even in the cases where they seem to have been most influential, various physical or functional states or disorders may have existed, so as to predispose the nervous system to be affected by them; or the moral emotion may have first occasioned some severe physical diseases, of which the mental disorder was the more immediate effect.

281. In proof of the predominance of moral over physical causes, most writers refer to the great frequency of insanity among highly civilized people, and its almost entire absence from savage or barbarous nations. The data, however, are not to be depended upon, as respects savage communities. It is not correct to say, as many have, that insanity is unknown among them. It certainly is comparatively rare, or very seldom occurs; but it does occur among the greatest of all savages; various circumstances, however, preventing persons in this state from being long troublesome to their friends or to the community; or, in other words, once an individual "loses his head," as the being insane is very generally termed, he is soon got rid of; and his insane acts, before his state is recognised, often directly or indirectly terminate his existence. On this subject Dr. Prichard remarks, that "in a barbarous state of society, the passions are under no restraint—the emotions are impetuous; hatred and ma-

lignity are in perpetual exercise; the fierce and sensual desires which are common to mankind and the inferior tribes are indulged without limit. Nor are the intellectual faculties without their exercise in carrying on the stratagems of barbarous warfare. We should conjecture that such a state of society, in which the passions are in perpetual and violent agitation, would not infrequently produce insanity." Still, I contend that these are not the chief moral causes of which this malady is so frequently a result; and that many of the physical disorders, which either predispose to or produce mental disorder, and which remarkably aid the operation of moral causes, are not very common in savage communities. If we contrast the emotions which powerfully affect the human mind in civilized society with those which have been just noticed, the consequences resulting from the former to the mind itself may be, in some measure, anticipated. When we consider the premature and excessive exertion of the faculties in highly civilized countries; the restraints imposed by social institutions and legislation, and the consequences which often arise out of them; the diversity of interests and of feelings brought into action by many pursuits, upon which wealth, honour, and even existence, depend; the long-continued anxieties, griefs, disappointed hopes, the family dissensions, and injured or lost affections; the chords of feeling too intensely strung; the prolonged or intense mental exertion; the continued tension of the imagination, or of the intellectual powers; the pride, ambition, and humiliations; the distractions of the mind by religion, by worldly speculations, and diversified engagements; the sudden reverses, the jealousies, and the numerous causes continually impressing the moral sentiments and affections, and increasing the susceptibility of the nervous system, as well as disordering the general health; when we contemplate the prevalence, the frequent recurrences, and often the almost constant operation, of all these circumstances in civilized life, we cannot be surprised at the effects produced by them upon the mind and nervous system, especially when we find that they seldom act singly, but generally in combinations, or associated with various predisposing and exciting or determining causes.

282. There are also other considerations, not to be overlooked in attempting to account for the greater prevalence of insanity in civilized than in savage communities. Children of weak physical powers are seldom reared among the latter; and the higher intellectual faculties, and the finer and more elevated moral affections, especially the powers of intellection, and the rational emotions of mind (see note, § 66), are imperfectly developed in them, and consequently less prone to experience or to originate mental disorder. In barbarous societies, the mind retains much of the constitution and character presented by it in childhood and boyhood in more civilized communities: it is incapable of comprehensive views and combinations of thought, or of prolonged exertion; it retains the sanguine disposition of youth, and is little susceptible of care and anxiety, and thinks of little but of present gratification and ease. On the other hand, while civilization develops all the finer emotions and affections, all the higher and more reflective faculties, and augments the susceptibility of the moral feelings, as well as the general sensibility, it tends also to disorder them the more, owing to numerous resulting circumstances, which inordinately excite or seriously disturb them, and which thereby often ultimately overthrow them altogether.

283. M. Georget, however, most probably overrates the influence of moral causes in the production of insanity. He believes that 95 out of 100 lunatics have become so from the operation of the affections and moral emotions; and he states this to have been the opinion also of M. Pinel. It is in the age, he adds, in which the mind is most susceptible of strong feelings, and in which the passions are excited by the strongest interests, that madness is principally displayed. It is chiefly, however, in the higher and middle classes of society that the moral causes are most productive of insanity. This is shown by the researches of Esquirol, Georget, Guislain, and others. It is in them that the influence of civilization, in increasing the frequency of the malady, is especially manifested; thus proving the justness of the remarks which I have ventured above, and which are partly founded upon my observation of the state of society in savage communities. Among the lower orders, physical causes have more influence than in the higher; and, of the moral causes, an unrestrained sway of the temper and passions is the most manifest. Physical causes are, according to the writers just mentioned, more influential in females than males; and in the former, among the lowest classes, I would add, that violence of temper is the most productive moral cause of the malady. In farther considering the *exciting causes*, I shall offer a few observations, 1st, on the more remarkable emotions of the mind, of which insanity is often a consequence; 2dly, on the physical causes of the malady; and, 3dly, on certain circumstances in the general habits and manners, and in the social and political states of our species, resulting from various combinations of moral and physical causes, which both indirectly and immediately occasion mental disease.

284. *A.* Of certain Moral Emotions.—*a. The more violent passions and emotions* sometimes, by their sudden or vehement action, more or less disorder the functions of the brain, especially violent anger and terror. Unrestrained bursts of temper are very frequent causes in the lowest classes of the community, and particularly in females, in whom it acts either directly on the brain, or consecutively, by first disordering the uterine functions, or in both modes. M. Esquirol, however, assigns a greater influence to fright than to anger; but mania is the form of the disorder which most frequently results from both these causes. Dementia much more rarely is occasioned by them. These emotions are the most intense and the most sudden of which the human mind is susceptible; and, fortunately, they are among the shortest in their duration. The nervous system, and particularly the functions of the brain, are more violently agitated by them than by any other; and in many instances, where no predisposition to insanity exists, fits of convulsion, tremors, and various nervous affections are

caused by them, especially in weak, nervous, and susceptible constitutions.

285. *Care, anxiety, grief, distress, and all the depressing emotions*, are the chief causes of mental disease. In the same category may be included domestic griefs and disagreements, family dissensions, ill-assorted marriages, reverses of fortune, disappointments, prolonged fears, mental humiliations, jealousy, wounded self-love. The tables which I shall give hereafter will show the relative influence of these and other causes in one civilized country. It will readily be admitted that it is chiefly in communities far advanced in civilization that these causes are most productive of this malady. These causes act very generally in combination, either with one another, or with various predisposing and physical circumstances: many of them operate upon the mind slowly and silently, and only by first disordering one or more of the bodily functions. Joy, and the more exciting emotions, less frequently occasion insanity than is commonly supposed. Esquirol states, that the opinion of Mead, as to the frequency of mental disorder from this cause, is not well founded; but he admits the importance attached by Pinel to the struggle between religious and moral principles, and the passions and worldly interests — a struggle sometimes long sustained, and terminating in impairment of reason, and especially in melancholia. It is not only in their individual, but also in their combined operation, that the causes of insanity should be studied: and in order that sound principles subservient to rational hygienic and prophylactic measures may be deduced from the study, the various combinations and successions of action should be recognised; and the intermediate changes, mental and physical, ought to be traced as far as the means of investigation may be furnished us. It is chiefly, also, by ascertaining the changes first induced in the functions of important organs, and the succession of morbid actions resulting therefrom, that we can be enabled to form rational or successful indications of cure.

286. *c. Religious impressions, and apprehensions of a future state*, are among the most important mental causes of insanity. *Religious madness*, as it has been termed, has long been an interesting subject to the philosophic physician; and its frequency in Great Britain demands from him a particular notice of the various circumstances connected with it. I cannot agree with Dr. Prichard, in considering that the number of persons who become insane from religious hopes and fears is much less considerable than it is generally supposed to be. The frequency of disorder from this cause varies remarkably in different places and in different times; and the mischief often becomes either endemic or epidemic, from every fanatic, or ambitious preacher, who is desirous of acquiring notoriety, or of being the originator, or the leader, of a particular sect—from any one, however slightly imbued with religious knowledge, or however ignorant, who wishes to be distinguished among those who are equally ignorant, but more honest, with himself—and from any one who, already partially insane, believes himself inspired, and called by the Almighty to instruct and convert men, before he is himself even partially instructed—being permitted to "deal damnation round the land," and to excite the feelings and the fears, or to distinguish the hopes, of the ignorant, the nervous, the susceptible, and of the hysterical, without any control as to education, doctrines, or religious principles. As the numbers of these adventurers increase or diminish, so do the victims of this encouragement to disturb the minds of the community also vary in number. In this vicious plenitude of liberty everybody enjoys not only entire freedom of thinking and speaking, but also of acting. The rogue who is too lazy to work is allowed, without inquiry into his knowledge or belief, and without hinderance on account of character or of the mischievous nature of his doctrines, to harass the feelings, to excite the imagination, and to blight the happiness of many of those who listen to him. It is not seen, or, if seen, in no way guarded against, that the more dangerous the doctrine, the greater the fanaticism, or the more vehement and impassioned the declamation with which it is promulgated, the more intensely are the uneducated affected, and the mind disordered by it. The more absurd and inflated the harangue, the more frantic the manner; and the greater the outrage on common sense and decency, the moral infection sinks the more deeply, and spreads the more widely, until mental disorder assumes a truly epidemic form. That this is not over-stated, is sufficiently proved by what has taken place recently in this metropolis, by the camp-meetings in America, and by the "revivals" in Scotland and in that country.

[Dr. Woodward attributes 100 cases out of 1141, of which the cause is stated to be "religion," which is certainly not a large proportion. Out of 843 cases of insanity received at the Bloomingdale Asylum, N. Y., and of which the causes are specified, but 59 are attributed to "religion" (40 cases to "religious excitement," 7 to "religious terror," and 12 to "religious anxiety and doubts"). These terms were given by the friends, and therefore are entitled to consideration. We have no doubt that many cases of insanity are attributed to this source which are, in fact, owing to other causes. But that the American "revival system," so called, as often carried out by enthusiastic religionists, is calculated to unhinge the mind from its moorings, and dethrone the intellect, we know from extensive personal observation; and we may be permitted to add, that we view the measures resorted to on these occasions no less destructive to sound morals and religion, than they are injurious to the physical and intellectual well-being of all who come within their influence. We would apply the same remark to "camp-meetings," and most of the other extraordinary means to awaken attention to the momentous subject of human destiny in a future state of being.]

287. The frequency of mental disorder from this cause has been insisted upon by Darwin, Perfect, Falret, Jacobi, and others, but somewhat doubted by Dr. Prichard. According to my own observation, I believe this to be a frequent cause of insanity in this country, particularly among Protestant dissenters—but of very irregular frequency, owing to the circumstances just alluded to. The forms of disorder caused by it are chiefly theomania, mel-

ancholia, suicidal insanity, mania, and mania complicated with hysteria. It must not, however, be supposed that religious feelings are generally the only and sole cause of mental disorder among persons whose minds are much engaged with these sentiments, or that all the cases of insanity in which the mind is occupied with religious ideas have proceeded either solely or chiefly from this source. In the great majority, perhaps, of instances, other moral causes, or even bodily disorders, have either predisposed the mind to be influenced by these feelings, or have been associated with them in their operation on the mind. Dr. Jacobi observes, that the original cause of derangement is often some misfortune, or some physical influence, religious ideas rather determining the morbid effect upon the mind than actually originating it. There is much truth in this, and it is most important in respect of treatment. I have witnessed several cases illustrative of the justness of this view; and, by acting upon it, they have had a favourable issue.

288. The more civilized the human mind, the more desirous it becomes to form anticipations of the future, or to entertain hopes and fears of good and evil, which are not limited to the present state of existence. In forming these anticipations, the knowledge of our imperfections, and of our numerous acts of demerit, naturally impart to them a certain degree of gloom or despondency; and accordingly we find, in all civilized ages and countries, that these feelings, when inordinately indulged—especially during states of physical disorder, or when the mind is already depressed by grief, anxiety, and bereavements, have caused mental disease. Dr. Heinroth has collected numerous instances from the early fables of Greece, showing that madness from this cause was not of rare occurrence in the ages of remote antiquity. The circumstances in the moral nature of mankind, on which religious insanity depends, cannot very materially change, and may therefore be expected always to produce their usual effects; still they may be more remarkably predominant, or very much less so, in certain periods and places, than in others; and that they have been, and still are, thus variable, is well known. Dr. Prichard observes, that in France, since the revolution, the influence of religion on the community has been less than it ever was in any civilized country; and French physicians have informed him that cases of religious insanity have become proportionately rare. M. Esquirol states, that the changes during the last fifty years, "in the moral sentiments and habits of the people, have produced more instances of madness in France than all their political calamities. The change in ancient customs and fixed habits, in old and established sentiments and opinions for speculative theories and dangerous innovations, has contributed to this. Religion now comes forward only as a formal usage on solemn occasions, and no longer affords her consolation to the afflicted, or hope to the desponding. Morality based on religion is no longer the guide of reason in the narrow and difficult path of life. A cold egotism has dried up all the sources of sentiment: there no longer exist domestic affections, respect, attachment, authority, or reciprocal dependences. Every one lives *for* himself; none is anxious to form those wise and salutary provisions which ought to connect the present age with those which are destined to follow it."

289. An enthusiastic, or a vehement and impassioned mode of preaching, and declamations abounding with frightful pictures and condemnation, are not confined to any sect; and, in some countries, are as common among Romanists as among Protestants and Protestant dissenters. The itinerant missionaries of all sects—of Romanists as well as of Protestants—are remarkable for fanaticism; and for modes of preaching, more calculated to disorder the minds of persons, who are already suffering the ills of life, the depressing passions, bereavements of affection or of fortune, exhaustion of nervous power, and bodily disease, than to afford the consolations which religion is intended to administer in these and other circumstances of distress.

290. The question which has been often agitated, as to the greater prevalence of insanity among Romanists and Protestants, may seem to bear upon this topic, but not so closely as it may at first appear; for, although mental disorders may be more frequent in the latter than in the former, it by no means follows that religious feelings are the causes of this frequency, or that the numbers of the insane are greatly increased by cases of this kind. The number among Romanists may be as great as that in Protestants, other circumstances compensating for the less influence of this cause in the former than in the latter persuasion. That religious insanity, however, is much less common in Romanists than in Protestants, especially Protestant dissenters, cannot be doubted by any one whose sphere of observation has enabled him to form any opinion on the matter. Dr. Hallaran (*Pract. Observ. on Insanity*. Cork, 1818, p. 32) states, that in the Lunatic Asylum at Cork, in which the admissions of Romanists are about ten to one of Protestants, no instance has occurred, within his recollection, of mental derangement in the former from religious enthusiasm; but that several dissenters from the Established church have been so affected. The reason of this difference is obvious. The ministers of the Romish church will not allow the minds of their flocks to distrust points of doctrine and discipline, or to fall into these doubts, which distract the minds of those who are either wavering in their opinions or entertain entire liberty of conscience.

291. While Hallaran, Guislain, Leupoldt, Burrows, and others, contend for the greater prevalence of mental diseases in Protestants than in Romanists, Jacobi and Chiaruggi believe that cases of religious insanity are also frequent in the latter. Dr. Jacobi remarks, that the character of religious madness in members of these two communities, and the manner of its accession, are, for the most part, different. In the lunatic asylumns of Roman Catholic Germany, many of the inmates of the lower classes have become religiously mad, from the delusions of a wild and unregulated imagination, excited by superstitious phantasms, through neglect of the culture of the understanding, and the overpowering influence of sensual passions. Dr. Prichard has given a table from Jacobi

of the comparative prevalence of insanity in the Romanists and Protestants of the Prussian States on the Rhine; and it appears from it that the proportion of lunatics in the former, compared with that in the latter, is as 11 to 10; and that the proportion is much higher among the Jews than in these persuasions. Still, this conveys no information as to the comparative prevalence of religious insanity among them.

292. Mr. Tuke's account of the Retreat, the asylum belonging to the Quakers or Friends, furnishes only 3 cases out of 149 which could at all be ascribed to anxieties connected with religion; and in his list of causes of insanity among the inmates of this asylum, pride, ambition, jealousy, rage, debauchery, penury, or care produced by hardships, &c.—causes so productive of insanity in other institutions—are not even mentioned. The exemption from these prevalent causes of mental disorder are attributable to the strictness of moral education and discipline, to the restraints imposed on the imagination and the indulgence of the passions, and to the absence of enthusiastic excitement on religious topics in this sect. Still, insanity is as prevalent among Quakers as among any other sect, relatively to their numbers, owing, as above remarked (§ 253), to the increased influence, in them, of hereditary predisposition.

[Dr. Macdonald remarks (*N. Y. Journal of Medicine and Surgery*, vol. i., p. 328) as follows on this subject: "One of the most intelligent members of the Society of Friends in Great Britain, and the author of a highly interesting work on the celebrated York Retreat, informed the writer, that the proportion of lunatics and idiots among his sect in England amounted to one in 200. Considering that there are only 20,000 Friends in England, and that marriages have been confined for many generations to this comparatively limited circle, the very great prevalence of insanity among them must be attributed, in a great degree, to this cause. The statistics of American insane institutions show that hereditary predisposition is by far the most influential cause of insanity in this country, as it is found to be in every other.]

293. From what has been now stated, it will appear that the frequency of religious insanity in different persuasions and sects will depend upon the excess of fervour characterizing them. Exuberance of zeal on any subject soon passes on to madness in some constitutions; and on religion, unless tempered by a sound judgment, it is apt to degenerate into fanaticism, and thence into delirium, which often becomes permanent. Excessive fervour, or enthusiasm, generally shows itself in religion when any revolution of opinion or doctrine takes place, and when new lights and new sects arise among those who have received a certain amount of education and religious instruction. Dr. Robertson (*Hist. of Charles V.*, vol. ii.) has well remarked, that "when the human mind is roused by grand objects, and agitated by strong passions, its operations are apt to become irregular and extravagant. Upon any great revolution in religion, such irregularities abound most at that particular period when men, having thrown off the authority of their ancient principles, do not yet fully comprehend the nature, or feel the obligation of those new tenets which they have embraced. The mind in that situation, pushed forward with the boldness which prompted it to reject established opinions, and not guided by a clear knowledge of the system substituted in their place, disdains all restraint, and runs into wild notions, which often lead to scandalous and immoral conduct. Such was the effect in the first ages of Christianity, as well as at the era of the Reformation. The renunciation of the ancient faith, and ignorance of that which they had embraced in lieu of it, excited converts to acts more resembling insanity than of that religion which inculcates the purest morality and government of our passions." Dr. Burrows states that he does not recollect an instance of insanity from religion in any person steadfast to his ancient opinions. Wherever the disorder was suspected to proceed from this cause, it was clearly traced to the adoption of new tenets which had not been comprehended, and found to originate during the conflict in deciding between opposite doctrines.

294. It must not be supposed, from what I have advanced, that the Christian religion is truly chargeable with causing insanity; it actually has an opposite tendency. Mistaken views, excessive fervour, unfounded fears, and various feelings arising from these sources, are the only causes of insanity in connexion with religion. Among those who entertain just and sober opinions on religious topics—who make Christian doctrines the basis of their morals, the governors of their passions, the soothers of their cares, and their hopes of futurity—insanity rarely occurs. The moral causes of derangement, which would not fail of producing injurious effects on others, prove innocuous in them, for these causes would be met by controlling and calming considerations and sentiments, such as would deprive them of intensity or neutralize their effects. Truly religious sentiments and obligations soothe the more turbulent emotions, furnish consolations in afflictions, heal the wounded feelings, administer hopes to the desponding, and arrest the hands of violence and of despair.

295. In considering how far insanity may have arisen from mistaken views, or ill-regulated zeal in religion, the influence of sounder Christian doctrines in preventing its occurrence from other moral causes ought not to be overlooked; but this beneficial influence is too often unheeded, from being seldom brought to the notice of the physician, or from being altogether concealed in the breasts of those who have experienced it, while the origin of mental disease in disordered religious feelings is obtruded upon his attention. If the data could be procured, I believe that it would be certainly found that the very great majority of those who have committed suicide in states of mind which at least very nearly approach, if they do not altogether amount to insanity, actually either have been of no religion at all, or have entertained a very imperfect and inadequate sense of it; and that religious obligations have often suppressed suggestions of suicide, which would certainly have been committed if these had not been entertained. And farther, I believe that a very large proportion of those who become insane, especially among the lowest and most ignorant classes, have fallen into this

state from the scope given to their temper and passions, and from other mental causes, deprived of that salutary control, and of those consolations furnished by the beneficent doctrines of Christianity. The tendency of Cowper to mental derangement was long opposed by the influence of true religious principles; and, in later life, a sense of his duties and obligations arrested his hand in the act of suicide.

[Owing to the very incorrect manner in which our last census was taken, it is impossible to state with accuracy the actual proportion of the insane to the population in our different states. If we take those states which have made such returns as may be relied on, and if European statistics of insanity are to be admitted as correct, then the proportion of lunatics to the whole population is greater in America than in Europe. But it is very doubtful, at least, whether much dependance can be placed on European statistics as connected with this subject. In Norway, which is believed to be the only European country in which a regular systematic plan of instruction has been adopted, the proportion of lunatics and idiots is 1 to every 551 inhabitants: a proportion certainly as large as exists in any part of the United States.

The following estimates are considered to be considerably below the actual number of the insane and idiots in the United States, though they are undoubtedly as correct, if not more so, than the statistics of other countries on this subject. The difficulty arises partly from the fact that the insanity of some will be concealed by their friends, while many monomaniacs, and those but slightly deranged, will not be enumerated, because not considered actually insane. On the other hand, it is probable that some who are not deranged, but whose mental faculties have become impaired by old age, or by defect of vision, or hearing, and some who are merely eccentric, hypochondriacal, and intemperate, will be included. The chief errors, however, in the census of 1840, it is supposed, relate to the number of the coloured insane in the United States.

Recapitulation.—Number of patients in the Lunatic Asylums of the United States in 1844, 2561. Number of admissions in 1844, 1926. Recoveries during the year, 845. Deaths, 294.]

Number of the Insane and Idiots in the different States and Territories.

States and Territories.	Whites.		Coloured.		Total.	Population.	Ratio of insane and idiots to the population.
	Supported at		Supported at				
	Public charge.	Private charge.	Public charge.	Private charge.			
Maine	207	330	56	38	631	501,793	1 : 795
New-Hampshire	180	306	8	11	505	284,574	1 : 563
Massachusetts	471	600	27	173	1271	737,699	1 : 580
Rhode Island	117	86	8	5	216	108,830	1 : 503
Connecticut	114	384	20	24	542	309,978	1 : 572
Vermont	144	254	9	4	411	291,948	1 : 710
New-York	682	1463	138	56	2340	2,428,921	1 : 1036
New-Jersey	144	225	46	27	442	373,306	1 : 845
Pennsylvania	469	1477	132	55	2133	1,724,033	1 : 808
Delaware	22	30	21	7	80	78,085	1 : 976
Maryland	133	254	99	42	528	469,232	1 : 889
Virginia	317	731	326	58	1432	1,239,797	1 : 866
North Carolina	152	428	192	29	801	753,419	1 : 941
South Carolina	91	285	121	16	513	594,398	1 : 1158
Georgia	51	243	108	26	428	691,392	1 : 1615
Alabama	39	193	100	25	357	590,756	1 : 1655
Mississippi	14	102	66	16	198	375,651	1 : 1897
Louisiana	6	49	38	7	100	352,411	1 : 3524
Tennessee	103	506	124	28	851	829,210	1 : 974
Kentucky	305	490	132	48	975	779,828	1 : 800
Ohio	363	632	103	62	1360	1,519,467	1 : 1117
Indiana	110	377	47	28	562	685,866	1 : 1220
Illinois	36	177	65	14	292	476,183	1 : 1631
Missouri	42	160	50	18	270	383,702	1 : 1421
Arkansas	9	36	13	8	66	97,574	1 : 1478
Michigan	2	37	21	5	65	212,267	1 : 3266
Florida	1	9	12	—	22	54,477	1 : 2476
Wisconsin	1	7	3	—	11	30,945	1 : 2995
Iowa	2	5	4	—	11	43,112	1 : 3919
District of Columbia	1	13	4	3	21	43,712	1 : 2082
Navy of United States	—	—	—	—	—	6,100	—
Total	4329	10,179	2093	783	17,434		
Population of the United States	—	—	—	—	—	17,068,666	1 : 979

296. *B.* Physical Causes of Insanity. — The *physical causes* of insanity may be divided into, 1st. Those which affect the encephalon chiefly and immediately; 2dly. Those which exhaust organic nervous power, and disorder the general organic sensibility; 3dly. Those which act upon remote organs or parts, with which the brain is disposed to sympathize. Under the head of physical causes, M. Esquirol has arranged *hereditary predisposition*. In treating of the causes of insanity, this should be viewed apart from the exciting physical causes; for, although it often appears to occasion insanity, without any other circumstance being recognised to develop the predisposition, and although it is strictly physical, it still requires, from its nature and influence, an early and seperate consideration (§ 251).

297. *a.* Of *the causes which more directly affect the encephalon—a. Insolation, sun-stroke*, and exposure of the head to great heat, as to the fires of forges, &c., deserve a passing notice. M. Esquirol has observed considerable influence from the last of these; and I have known several instances of exposure to the heat of the sun in warm climates, and in hot days in temperate countries, having developed an attack of mania. Cases of this kind partake

much of the character of phrenitis, and are actually such in most cases, especially at their commencement; while in others, more or less of congestion takes place, or follows a state of inflammatory action. It is chiefly where a marked predisposition has existed, or moral causes have co-operated with this, that mental disorder is developed, or persists for a considerable period. In some instances, exposure to the sun's rays first produces an epileptic seizure, the derangement of mind either immediately following it, or appearing after several recurrences. These cases more obviously proceed, at first, from the congestion, or vascular turgescence of the brain, or of its membranes, caused by the solar rays. Exposure to the heat of *charcoal fires* has also been observed to cause insanity, the fumes of these fires probably contributing to these injurious effects. The liability of cooks to mental disorder, which has been remarked on the Continent especially, is probably attributable to this cause.

298. *β. Frequent or habitual determinations of blood to the head*, and *congestions of the brain and its membranes*, are among the most common physical causes of insanity, especially when an hereditary disposition to it exists; but, frequently, some fully-developed or specific organic malady of the brain appears before the effect upon the mind is manifested, especially *apoplexy* and *paralysis*. In these latter cases, softening of a portion of the brain, or hæmorrhage in some part of it, or both lesions, with various attendant changes, are the more immediate effects, and upon these the mental disorder is only contingent in some instances. When mental disease follows apoplexy, some form or other of paralysis is often associated with it. The varieties of mental disorder consequent upon *apoplexy*, or upon *paralysis*, or upon both, are chiefly the several grades of dementia and forms of partial insanity; but any other variety may also proceed from them. (See art. Apoplexy, § 52, *et passim*.)

299. *γ. Epileptic* and *convulsive affections* are, perhaps, more frequently productive of insanity, and especially of the several grades of dementia (§ 155, 156), than any other disease, unless, perhaps, *apoplexy* and *paralysis*. M. Esquirol states that, of 300 epileptics in the Salpêtrière, more than one half are insane. It may be supposed that the influence of epilepsy in causing insanity depends chiefly upon congestion of blood on the brain, or vascular determination to it; but this inference may be only partially correct; for, even admitting that these lesions of the cerebral circulation are present in many epileptic cases, it does not follow that they exist in all of them. I believe that it will be found that when epilepsy is connected with, or depends upon a deficiency of blood, and great impairment of nervous power (see art. Epilepsy, § 27), that it is more apt to be followed by insanity than when attended by either congestion or determination of blood to the brain. M. Esquirol remarks that, although epilepsy and convulsions are often causes of insanity, especially of furious mania and dementia, that *vertigo* still more frequently precedes, and is more destructive to the mental powers than they. I believe that vertigo more frequently proceeds from an impaired circulation in the brain, conjoined probably with weakened organic nervous energy of this organ, than from opposite states of the circulating and nervous system. *Cataleptic* and *ecstatic* affections and *somnambulism* may also lapse into mental derangement; or, in other terms, the states of nervous influence and of cerebral circulation causing these affections, may be only early stages or grades of the same physical disorder of which insanity is the consequence.

300. *δ. The transference or metastasis of disease to the encephalon* is a not infrequent cause of insanity, especially where a predisposition to it exists. The sudden disappearance, or the suppression of cutaneous eruptions, of accustomed discharges and evacuations, and of certain painful or constitutional maladies, has often been followed by mental disease. Cases illustrative of the production of inflammatory and other diseases of the brain and of the various forms of insanity from these causes, abound in all practical medical works. The suppression of herpes, of scabies, and of other chronic cutaneous eruptions—of various discharges, as leucorrhœa, chronic diarrhœa, &c.; of hæmorrhagic evacuations, as epistaxis, hæmorrhoids, menorrhagia, and of gout and rheumatism—has frequently been followed by insanity, and especially by mania and melancholia, either in their simple forms, or complicated with paralysis or epilepsy. Where the mental disorder thus supervenes, distinct evidence of acute or sub-acute inflammation of the brain or of its membranes, or of both, is often evinced for some time before the mind becomes disordered.

301. *ε. Inflammatory, and other diseases of the brain*, are frequently followed by mental derangement. The delirium symptomatic of these maladies, and of fever with predominant affection of the brain, may subside into one or other of the forms of partial or general insanity; and the various organic lesions occurring in the encephalon and its membranes may be attended at an early stage with more or less mental disorder; or, after having given rise to epilepsy, paralysis, or apoplexy, may be followed by such disorder. In such cases, however, the mental affection is to be viewed rather as a contingency than as a necessary consequence of the organic disease.

302. *ζ. Injuries of the head* are sometimes productive of insanity, owing chiefly to chronic or slow inflammatory action, and its consequences in the brain or membranes. In some cases, acute disease, attended by delirium, is the first effect; but, consequent upon this, any grade of chronic insanity may appear. Occasionally even the mental affection does not occur until years have elapsed from the receipt of the injury, and it then may present every grade of severity, and may even be associated with epilepsy or paralysis. During the long interval that may thus elapse, various symptoms referrible to the encephalon are generally complained of, and are sometimes so manifest to the physician as to lead him to dread the impending calamity, and to employ means which as often fail as succeed in averting it. Dr. Prichard remarks that there are instances in which a slight peculiarity of character, not amounting to insanity, has remained long, and perhaps through the life of the individual, who

has sustained a severe injury of the head. Sometimes this amounts to a kind of moral insanity, the temper being more irritable, and the feelings less under restraint than formerly. In other instances, there have been greater energy and activity, more of excitement in the general character, which have been thought a change for the better, rather than a morbid alteration; of this, two remarkable cases have come under my own observation. Van Swieten, Haller, and others have adduced instances of congenital and puerile imbecility having been removed by injuries on the head; and Doctor Prichard mentions a family, consisting of three boys, all idiots, one of whom, having received a severe injury on the head, had his faculties restored, and became a professional man of good talents.

303. *b. Whatever greatly exhausts organic nervous power*, both predisposes to, and directly occasions insanity.—*a.* Many, however, of those causes, which thus affect nervous energy, favour congestion on the brain, and occasion disease of other vital organs, tending to disorder the functions of the brain sympathetically. Of these, the most influential are masturbation and libertinism, or sexual excesses, sensuality in all its forms, and inordinate indulgence in the use of intoxicating substances and stimulants. The baneful influence of the *first* of these causes is very much greater, in both sexes, than is usually supposed; and is, I believe, a growing evil, with the diffusion of luxury, of precocious knowledge, and of the vices of civilization. It is even more prevalent in the female than in the male sex; and in the former it usually occasions various disorders connected with the sexual organs—as leucorrhœa, displacement of the uterus; difficult, or disordered, or suppressed, or profuse menstruation; both regular and irregular hysteria, catalepsy, ecstasis, vertigo, various states of disordered sensibility, &c., before it gives rise to mental disorder. In both sexes, epilepsy often precedes insanity from this cause; and either it or general paralysis often complicates the advanced progress of the mental disorder, when thus occasioned. Melancholia, the several grades of dementia, especially imbecility and monomania, are the more frequent forms of derangement proceeding from a vice, which not only prostrates the physical powers, but also impairs the intellects, debases the moral affections, and altogether degrades the individual in the scale of social existence, even when manifest insanity does not arise from it. Sexual excesses, and libertinism in persons predisposed, hereditarily or otherwise, have a similar effect to the former cause, although neither so frequently nor so certainly; the mental disorder generally assuming the same forms and morbid associations as have just been mentioned.

304. *β. Intoxicating substances and stimulants* are causes of mental disorders in most countries; but they are among the most influential of all the exciting causes in the lower classes, particularly in the United States of America, in Great Britain and Ireland, and in Germany. In France, Italy, and Spain, this vice is much less frequent. Spirituous liquors are the most generally indulged in, and are the most injurious in their effects, not only on the nervous system, but also upon the digestive and excreting organs. A large proportion of the admissions into pauper lunatic asylums arise from this cause, especially in large cities and manufacturing towns and districts. Mania, monomania, and melancholia most frequently proceed from the abuse of intoxicating liquors; and the cases which are thus caused are among those which are oftenest cured, at least for a time. The removal of the cause, and the use of sedative means, generally cure the attack; but relapses or recurrences are more frequent in these than in any other class of cases.

[Dr. Dunglison (*Cyclop. of Pract. Med.*, vol. iii., p. 49) remarks that, although alcoholic liquors are a common cause of delirium—*delirium tremens*—they are not, so far as he has observed, a frequent occasion of insanity; and he refers, in support of this opinion, to the fact that insanity is frequent among the Society of Friends, who rarely indulge in the use of intoxicating drinks. But this has already been accounted for from hereditary predisposition (p. 565, § 292) occasioned by another cause. We agree, on this subject, with those who think that the use of alcoholic liquors is the most common and extensive cause of insanity in this country. Dr. Woodward, as already stated, gives 204 cases out of 1141 of insanity known to arise from this cause, and thinks that many of the cases arranged under "ill health," "fear of poverty," "loss of property," "domestic affliction," "religion," &c., &c., would more properly fall under this. In this opinion we cordially concur, and believe that it will be sustained by the statistics of all our insane hospitals, as it is by every day's observation and experience. That there is something in the habitual stimulation of alcohol which is calculated to weaken the reasoning faculty, undermine the judgment, pervert the moral sense, and induce disease in important organs, as the brain and liver, which indirectly lead to mental unsoundness, is now too well established to need any argument at our hands.]

305. The excessive use of opium is as injurious to the nervous energies and to the mental powers as addiction to spirituous liquors; but the ill effects resulting from it on the mind are not often observed in this country. I have known several instances, all of them females, of the acetate of morphia having been used, instead of opium, as a restorative and intoxicating agent. It was ultimately more or less injurious in all; and in one, partial insanity, with suggestions of suicide, appeared; but probably other causes contributed to the morbid effect.

306. *γ.* The abuses of *mercurials*, and particularly of *calomel*, as a common or frequent purgative, has, in several instances in which I have been consulted, been productive, first, of depression of the nervous power, and of a morbidly increased state of the general sensibility, and, subsequently, of melancholia and other forms of monomania. A surgeon, a pupil of the late Dr. Currie, was in the habit of taking large doses of calomel at least twice, but more frequently oftener, in the week. He believed himself subject to disease of the liver, resorted to this medicine when he found his spirits greatly depressed, and considered that he was better the day after taking it. He persisted in the frequent use of calomel, and became more and more nervous and hypochondriacal. He was

afterward melancholic, entertained mistaken views of religion, and attempted suicide, which he accomplished in a subsequent attempt. The daughter of a clergyman in this city was attended by this surgeon, and had very frequently taken large doses of calomel. Her health and spirits had become remarkably impaired, and her intellects disordered. There was no hereditary predisposition to insanity on either side of the family. She had been fond of company and amusements; but was melancholic, physically out of health, tormented by the most distressing religious fears, and refused being seen by her relatives and former friends, when I was directed to visit her. Her despondency, mental misery, and religious delusions were remarkable; and she had frequently contemplated suicide, in order to terminate her suffering. She completely recovered under a restorative treatment, aided by change of scene and of air, and by suitable moral management.

307. *δ. The too frequent or excessive use of colchicum*, for the removal, suppression, or prevention of gout, has given rise to insanity in three instances in which I was consulted. In one of these melancholia was the more immediate disorder of the mind; in the others, incoherence and imbecility, with illusions, were the consequences. All powerful *depressants*, and even *cold*, either excessive in grade, or prolonged in its operation, may occasion insanity by their operation on the nervous power.

308. *ε. Excessive or prolonged lactation*, relatively to the patient's strength, profuse evacuations, particularly leucorrhœa, frequent menorrhagia, profuse hæmorrhoidal discharges, &c., have also induced melancholia, and other partial forms of insanity, and even imbecility, or more complete dementia, chiefly by exhausting the vital powers, especially of the nervous system. It will afterward be shown that *puerperal insanity* is occasioned partly by this cause, or rather by the evacuations consequent upon parturition, in connexion with previous suffering and increased susceptibility of the nervous system. Something also may be imputed to the altered state of the general circulation, and of the condition of the uterine organs.

309. *ς. Diseases of Organs with which the Brain more or less sympathizes*, not infrequently cause insanity when a predisposition to it already exists. So intimately associated in function are all the organs of the body, through the numerous bonds of union furnished by the organic nervous and vascular systems, that serious disease seldom exists in either, without the functions of one or more of the others being remarkably disturbed; and when visceral disease occurs in a person who has an hereditary or an acquired predisposition to mental disorder, the former is often the cause of the development of the latter; various other circumstances, however, moral and physical, often cooperating with this cause in the production of the morbid effect upon the mind. Of this class of physical causes, habitual constipation, inflammatory irritation of the gastro-intestinal mucous surface, diseases of the heart and lungs, functional disorders and organic lesions of the uterus, and diseases of the biliary and urinary organs, are the most important. It is chiefly when these visceral maladies appear in an obscure and insidious manner, and proceed slowly, that the functions of the brain become disordered in a chronic form.

310. *α.* Without attributing nearly so much influence, as M. Broussais has done, to inflammatory irritation of the *gastro-intestinal mucous surface*, it cannot be denied that its pre-existence is of considerable importance in the production of the mental disorder. But it is very seldom the sole physical cause in these cases; most commonly, exhaustion or depression of the organic nervous influence co-operating with it in producing the effect upon the mind. The disorder of the digestive organs is generally caused by the excessive use of stimulating and indigestible food among the opulent; and by constipation, intemperance, unwholesome food, and by cold and want among the lower classes. In these cases, hypochondriasis, or hypochondriacal melancholia, first appear; and various forms of general insanity supervene.

311. *β.* Severe functional and organic disease of the *heart* or *lungs* may excite insanity in the predisposed, owing to disorder of the circulation in the brain, consequent upon interruptions of it in these organs. When mental derangement follows diseases of the *biliary* or of the *urinary organs*, it may proceed more immediately from the influence on the brain of the excrementitial matters accumulated in the blood, in consequence of the impaired or disordered function of these organs.

312. *γ.* Of the operation of the functional and organic affections of the *uterine organs* but little need be here added to what has already been observed. In these cases, the sympathetic effect takes place, most probably, by the propagation to the spinal cord and brain of irritation originating in the sexual apparatus; and the mental disorder is generally preceded and attended by one or more of the numerous forms of hysteria, or by epilepsy, and sometimes also by hypochondriasis, or great lowness of spirits. This is especially the case when the catamenia are difficult or suppressed. In many cases, not only uterine disorder, but also gastro-intestinal irritation, is accessory to the causation of the mental disease.

313. In considering the operation of all these physical causes, it should not be overlooked that it is often extremely difficult to determine whether the disorder originates in the brain—the other organs sympathizing with it—or whether the disturbance of the mental powers is altogether owing to disease of viscera remote from the encephalon. But, however difficult it may be, an attentive examination of the history and existing symptoms of the case should be instituted to the determining of this point, as much of the success of treatment will depend upon correct views regarding it.

314. *δ.* When organic nervous or vital power is much depressed, especially in respect of the digestive and excretive functions, *accumulations of morbid secretions, and collections of fæcal matters*, are liable to form in the intestinal canal, and particularly in the *cæcum* and *colon*. These dilate, displace, irritate, and obstruct the bowels, occasioning flatulent distention, spasm of the muscular coats, and various disorders of the whole tube, as well as of the collatitious viscera. These morbid accumulations are apt to occur even in persons who suppose their bowels perfectly open and regular; and they

more certainly take place in those who are habitually costive or constipated. The effects, however, of collections of morbid secretions in the bowels—particularly in the large bowels—are not limited to these, or even to the adjoining viscera; although, if even thus limited, they would often be sufficient to excite, by the intimate sympathy existing between the digestive organs and the brain, functional disorder of the latter, especially in persons already disposed to such disorder. But there is every reason to believe, that when morbid or fæcal matters accumulate in the intestines, either with or without constipation, the chyle thereby becomes more or less impure or contaminated, and that a portion of these matters is absorbed into the circulation, the blood being consequently altered, and a state of general cachexia being thus produced. Where the predisposition to insanity already exists, the morbid materials conveyed into the blood will be often sufficient to derange the functions of the brain; and, not infrequently, this consecutive derangement will not be limited to these functions, but will extend to several others.

315. The sympathetic influence of the digestive organs on the brain, in connexion with the deterioration of the chyle, and the absorption of excrementitious matters from the bowels into the blood, will in this manner occasion hypochondriasis, melancholia, partial and general insanity, and, ultimately, even some of the complications which these occasionally present. The displacements and dilatations of the colon so often observed in melancholia, and sometimes also in other disorders of mind, most probably result from frequent or habitual constipation, even previously to the appearance of mental derangement. And the inflammatory irritation of the gastro-intestinal surface, already noticed (§ 310), as causing and attending many cases of insanity, is probably the more immediate effect of the impaired energy of the digestive canal, and of the accumulation in it of morbid matters; the consequences as respects the chyle and the blood, just contended for, increasing the effects upon the functions of the brain. The influence of constipation, or even of habitual costiveness, in causing insanity, and the good effects of powerful purgatives in the treatment of it, were well known to the ancients, and to most of the older writers; and, though fully recognised in this country, have been imperfectly estimated on the Continent in recent times, and even erroneously viewed by many, and particularly by Broussais and his disciples.

316. *ε.* Besides the above physical causes, *pregnancy*, the *accumulation* of morbid matters in the intestinal canal, and *of bile* in the biliary apparatus, the presence of *worms in the bowels*, *hypochondriasis*, and *hysteria*, frequently give rise to insanity. The abuse of medicines, and of all substances which act powerfully on the nervous system, and especially of green tea or of coffee, is occasionally, also, a cause of mental disorder.

317. *ζ.* M. Esquirol (*Mal. Ment.*, t. i., p. 64, et t. ii., p. 682) has given the following *tables of the causes of insanity*, the *first* comprising only the physical causes among female cases; the *second* embracing both physical and moral causes in cases of both sexes at Charenton.

Physical Causes.	Salpêtrière.	M. Esquirol's Establishment.
Hereditary predisposition	105	150
Convulsions of the mother during gestation	11	4
Epilepsy	11	2
Disorders of the catamenia	55	19
Consequent on lying-in	52	21
Critical age	27	11
Progress of age	60	4
Insolation	12	4
Injuries of the head	14	4
Fevers	13	12
Syphilis	8	1
Mercury	14	12
Intestinal worms	24	4
Apoplexy	60	10
	466	264

Causes, Physical and Moral.	1826.	1827.	1828.	1829.	1830.	1831.	1832.	1833.	Total.
Hereditary predisposition	19	19	58	65	70	36	38	34	237
Masturbation	7	9	7	7	10	3	3	6	52
Libertinism and excesses of all kinds	8	8	8	12	25	15	33	37	146
Abuse of mercury	3	3	10	13	6	5	1	3	44
The abuse of spirituous liquors	22	17	25	11	16	10	18	15	136
Insolation, &c.	0	5	2	1	2	0	2	0	12
Injuries on the head	1	1	2	9	3	2	1	1	20
Suppression of accustomed evacuations	5	4	4	13	3	12	7	6	54
Suppression of habitual suppuration	0	0	0	0	1	0	2	0	3
Consequent upon parturition	2	3	5	8	1	2	3	4	28
Cerebral affections	0	0	0	0	0	6	6	5	17
Epidemic cholera	0	0	0	0	0	0	3	0	3
Domestic distresses, &c.	36	22	29	26	47	38	40	38	278
Excessive study and watchings	2	3	3	2	2	1	2	1	16
Reverses of fortune	7	7	6	5	3	15	2	4	49
Gambling	0	0	2	0	1	2	0	0	5
Jealousy	3	2	8	2	0	1	1	0	18
Disappointed affection	12	9	8	2	3	1	2	0	37
Wounded self-love	4	1	1	2	3	2	2	1	16
Fright	1	0	4	8	14	5	2	1	35
Exalted devotion	7	9	2	1	3	1	1	0	24
Excessive joy	0	0	1	0	1	0	0	0	2
Reading romances, &c.	3	3	7	0	0	0	0	0	13
Political events	0	0	0	0	13	15	3	1	32
									1375

318. M. Esquirol remarks, that the causes were often ascertained with much difficulty, as the patients themselves were generally incapable of assigning them, and the friends could not always do so, at least with any degree of precision. It is probable, however, that two or more causes were concerned in producing the effect, and that various circumstances were omitted; he considers that hereditary predisposition is much more frequent than stated in the above table. Under the head of domestic distresses are included all the moral affections which are called into action in the interior of a family. The political changes in Paris in 1830 gave rise to the cases from this cause, and to those produced by frights.

319. *η. Sol-lunar influence* was very generally supposed to excite or to favour the appearance of insanity, as well as to cause exacerbations of the malady. M. Esquirol could not verify this opinion by the results of his experience. It is probable, however, that electrical states of the air, or sudden vicissitudes of the atmospheric electricity, in connexion with similar changes in the electrical currents through the body, have some influence on this malady. The effects of excessive cold and of great heat in causing madness, and the excitement produced in lunatics by atmospheric commotions, are indications of this influence. However this may be, there can be no doubt of marsh mias-

mata being a not uncommon cause of insanity, and especially of melancholia and dementia.

[The causes of insanity in this country have been very successfully investigated by Doctors Macdonald, Earle, Woodward, Brigham, and other physicians connected with our different insane hospitals, and the results spread before the public in the annual reports of these institutions. We shall present the results of investigation as deduced from observations made at the Bloomingdale Asylum, and the Massachusetts Hospital at Worcester, as conveying a very accurate idea of the comparative efficiency of the various causes of mental diseases as operating in the United States.

The professions and occupations that furnished the largest number of insane were the following: Farmers, 106; merchants, traders, 89; clerks, 45; labourers, 35; seamstresses, 29; grocers, 25; tailors, 19; students, 19; seamen, 17; tavern-keepers, 12; state-prison convicts, 11; cabinet-makers, 8; clergymen, 6; manufacturers, 6; gentlemen, 5; hatters, 5; sea-captains, 16; curriers, leather-dressers, 16; shoemakers, saddlers, 15; carpenters, 25; house-servants, 22; lawyers, 20; iron founders, 18; farm-labourers, 12; physicians, 12; masons, 11; teachers, 10; painters, glaziers, 8; bakers, 5; butchers, 5; watchmakers, jewellers, &c., 5: total, 663.

Dr. Macdonald has remarked, that it is evident, from an inspection of this table, that the classes most subject to insanity are those which are connected, either directly or indirectly, with commerce, and dependant on it for a livelihood. Of 804 persons whose occupations were ascertained, 242, making about 30 per cent., were dependant on commerce. The producing classes, including farmers, mechanics, labourers, &c., and making up the great bulk of inhabitants, furnish 395 out of 804 cases of insanity, or 49 per cent. Of these, the tillers of the soil, including 106 farmers, 12 farm-labourers, 2 planters, and 2 gardeners, amount to 122, or rising 13 per cent., and mechanics to 206, or rather more than 23 per cent. of the whole number of vocations ascertained. Persons of studious habits, including the learned professions, and amounting to 67, form about 8½ per cent. of the whole number, leaving but 12½ per cent. from all the occupations not embraced in the above classes. Of persons exposed to the inhalation of deleterious gases, there were 14 in all, including 2 practical chemists, 8 painters, 1 manufacturer of soap containing prussic acid, and 3 white-lead workers.

Causes.—The most important *physical causes* were the following: Hereditary, 155; cerebral disease, connected with apoplexy, palsy, and epilepsy, 55; suppression of established discharges, 5; lead in cider, and fumes of white-lead, 5; bodily disorder, 48; following parturition, 43; constitutional, 34; succeeding fever, 31; functional and structural disease of uterus, 20; masturbation, 16; injury of the head, 15; congenital, 13; rapid growth at age of puberty, 13; metastasis, 9; cessation of menses, 8; insolation, &c., 6.*

The most important *moral causes* were as follows: Pecuniary embarrassments and losses, 59; religious excitement, 40; domestic trouble, 31; over-exertion and abstraction of mind, 26; grief, or loss of relations, 23; unrequited love, 20; unhappy marriage, 17; anxiety of mind, 17; wounded pride and disappointment, 13; religious anxiety, &c., 12; remorse, 13; terror, 9; avarice, 8; religious terror, &c., 7: total, *physical causes*, 511; *moral causes*, 843.

Dr. M. remarks, that "when we look over our extensive country, and consider its immense progress in civilization, wealth, and luxury, the varied and increasing temptations to embark in the wildest schemes of speculation, the sudden accumulation and loss of fortune, the fluctuations of trade, the interest taken by almost every citizen in every political and financial movement that agitates the community, the activity of mind everywhere apparent, the fierce strifes of the predominating passions of ambition and avarice, involving so many minor ones, and extending their influence throughout every class of society, we are compelled to believe that we have among us as many active causes of insanity as any country in Christendom."

At the Massachusetts State Hospital at Worcester, 157 were farmers, 117 labourers, 52 shoemakers, 50 seamen, 45 merchants, 37 carpenters, 29 manufacturers, 25 teachers, 18 students, 15 blacksmiths, 14 printers, 11 tailors, 9 machinists, 5 clergymen, 4 lawyers, 3 physicians, &c., and many not classed. The male patients had been previously employed in 54 trades or occupations; the females from all the employments pursued by the sex in every department of industry. Dr. W. very truly remarks, that the production of insanity more generally depends upon the temperament than upon the employment, and that few become insane who have good habits, calm and quiet tempers, and thorough discipline of their feelings. Among the *causes*, we have: From intemperance, 204; ill health, 208; masturbation, 113; domestic affliction, 145; religious, 100; property, 77; disappointed affection, 58; disappointed ambition, 28; epilepsy, 40; puerperal, 36; wounds of the head, 17; abuse of snuff, &c., 8; hereditary, 388; periodical, 251; homicidal, 20; actual homicides, 15; suicidal, 154; actual suicides, 7: dark eyes and complexion, 399; light hair, eyes, and complexion, 389: from physical causes, 633; from moral causes, 408. Intemperance, it will be seen, takes the first rank among the causes of insanity, and, as Dr. W. well observes, "is not only the cause of insanity, but is too frequently the source of other evils, which are prolific causes of the disease. If we could ascertain how many of the cases of ill health, of domestic affliction, of fear of poverty, loss of property, and even religious depression and melancholy, arise from it, the list would be appalling, and would be nearly or quite double what it now is." If we seek for the cause of insanity among men who pursue laborious occupations in the open air, we shall find it, for the most part, in intemperance; for example, of 114 farmers, Dr. W. states that 43 became insane through this cause; of 70 labourers, 44; of 36 seamen, 22 were intemperate, and this was the occasion of their insanity. Dr. W. also enumerates "partial paralysis of the brain" as the cause of insanity in 15 cases; a pathological condition connected

* [Intemperance is stated to have caused about one fourth of all the cases admitted, though not enumerated among the other causes.]

also with the intemperate use of alcoholic drinks.—(*Ninth Annual Report*, &c., 1841.) Of 4089 patients, whose cases have been stated at five American institutions, the disease is supposed to have originated, from physical causes in 2026, from moral causes in 1445, and in 618 no cause was ascertained. Nearly all the physicians of the American asylums believe in the paramount influence of physical agents in the production of this disease. It is, however, very evident that the remote as well as immediate causes are often involved in obscurity, and that observation and opinion are influenced to a very considerable extent by preconceived theory.]

220. *C.* Various circumstances arising out of the manners and social and political states of a community may increase the frequency, or contribute to the production of insanity. Still, these states are more or less connected with the affections of the mind and the other moral causes, or are resolvable into them. —*a.* The social conditions resulting from prevailing modes of education have been considered by M. Esquirol as most influential in increasing the numbers of the insane. Too much care is taken to cultivate the mind, not considering that the affections of the heart require equal care. In all classes an education is bestowed upon the young above what is suitable and proper to their station in society; and hence, sentiments of ambition and of discontent with their condition are instilled into their minds from childhood. This early and ambitious education raises the mind of the young above, and too often in opposition to, the experience of their parents; and hence the opinions of the latter are despised or neglected. A person who has not been duly controlled in childhood is ill able to endure the vicissitudes and reverses to which an active life exposes him in the present state of society; his passions being thereby deprived of a salutary curb, and his reason of its surest props, insanity often follows upon the least adversity. The manner of living in the easier classes of society—the passion for dress, for exciting romances, for intrigue, for frivolities and amusements, engender a constant thirst for excitement, and increase the frequency of nervous complaints and mental disorders. The vices, and the miseries and privations consequent on these vices, in the lower grades of society, have a no less marked influence in causing the latter of these effects more especially.

321. *b.* In country districts, the prevailing passions are less turbulent and exciting than in cities and large towns. Love, anger, and domestic contrarieties are the most frequent moral causes of mental disorder in the former; while in the latter, ambitious views, speculations, disappointed hopes, reverses of fortune, excessive mental labour, watchings and late hours, greater depravation of manners, and more vicious indulgences, are added to these; and, consequently, insanity is more prevalent in populous, commercial, and manufacturing towns than in rural places. In proportion as the latter causes are prevalent in any community, and are aided by a more or less general propensity to drunkenness, or to libertinism, or by the vices of education, and of conduct in the richer classes, and by the want of both in the lower orders, so do the disorders of the mind become more frequent.

322. *c.* Even *forms of government* have considerable influence in contributing to this result. There is not the least doubt of the ill effects of a too great freedom of public opinion and acts, and of public writing and speaking, upon mental sanity. With the freedom of opinion, and the latitude allowed to the expression of it, without regard to the feelings and the interests of individuals, or to the morals and sympathies of the community, those emotions which most seriously disturb the mind, are brought into the most violent and distressing action, and the calm dictates of reason thereby overthrown. The political strifes, the popular elections, the borough and parish contentions, in this country and in the United States of North America, furnish sufficient proofs to the candid mind of the truth of this position. The exciting, the contaminating, and the disgusting occurrences and circumstances which daily, and even hourly, are placed before all classes in society, in most exuberant variety and particularity of detail—the moral poison with which the whole is garnished, in the lowest, the cheapest, and the most diffusible of these vehicles of abominations and of mental infection—the liberty which contaminates the innocent, demoralizes the public, injures the feelings, and benefits only the worthless and the base—all tend to the consummation of the injurious effect upon the mental health of the community —to the increase of crime, of madness, and of suicide.

> "Here, by the bonds of nature feebly held,
> Minds combat minds, repelling and repell'd:
> Ferments arise, imprison'd factions roar,
> Repress'd Ambition struggles round her shore;
> Till, overwrought, the general system feels
> Its motion stop, or phrensy fire the wheels."

323. *d. Political commotions*, by exciting revenge, and the more violent passions of the public, by fomenting ambition, by rousing to intellectual exertions, and by overturning fortunes and the established order of things, have a marked influence in augmenting the frequency of insanity. The frights, terrors, outrages, distresses, and losses of fortunes, of friends, of honour, &c., consequent upon foreign invasions, sieges, and civil and domestic wars, are most frightful causes of derangement on these occasions. Numerous proofs of this have been adduced by the French and German writers since the last war. Revolutions, moreover, do not only greatly increase the numbers of the insane, but also impart certain characters to the prevailing mental disorders. M. Esquirol observes that, when the ancient monarchy was destroyed, many became mad from the loss of fortune and friends, and from the frights and terror caused by the consequent anarchy. When the pope came to France, religious insanity was most frequent; and when Napoleon made princes and kings, insanity from ambition and pride was frequent, and kings and queens were numerous among lunatics. Religious revolutions have a similar influence; and even the prevailing ideas called into existence or activity by these revolutions, by great political events and by popular commotions, contribute both to the frequency and to the character of this disorder. The prevalence and features of madness during the Crusades and for long af-

terward; during the Reformation in Germany, the Low Countries, and Great Britain; and during the civil wars and the temporary domination of Puritanism, under the Long Parliament and Cromwell, are illustrations of what I have just advanced.

324. *e.* M. Esquirol states, that a sedentary, indolent, or inactive mode of life favours the occurrence of insanity; and that persons who have been accustomed to a very active life, as merchants, traders, professional men, and soldiers who have led an irregular and an eventful life, are liable to this malady when they settle to the enjoyment of wealth and splendour.

325. *f.* Another circumstance of great importance presents itself in the relative frequency of insanity in the *married* and *single*. The following table contains the results furnished on this subject by Esquirol, Desportes, Jacobi, and Prichard:

	Desportes.		Jacobi.		Esquirol.	
					Charenton.	
	Salpêtrière. Females.	*Bicêtre.* Males.	Females.	Males.	Females.	Males.
Unmarried	980	492	599	974	193	505
Married	397	201	156	176	363	387
Widowers and widows	291	59	80	30	69	40

The differences in these results depend much upon the classes of persons admitted into the institutions from which these results are obtained, and upon the limitations observed as to admission. Still, enough is proved by them to suggest important considerations connected with the hygiene and prophylaxis of insanity. With respect to the results which are here adduced, Dr. Prichard observes that, as it appears probable that celibacy tends to augment the numbers of lunatics, an inquiry is suggested as to the manner in which this result ensues. Is it through the restraints which the condition of celibacy imposes, or through the vices to which unmarried persons are more frequently abandoned? M. Esquirol is of opinion that, where one case of insanity arises from the former cause, a hundred result from the latter. A case occurred to me some years ago of a well-educated man, hereditarily disposed to insanity, who, after long periods of continence, experienced symptoms premonitory of mania. He married soon after having been under my care. Several years have since elapsed without any indication of mental disorder having appeared. Persons happily married generally lead more regular lives, in all respects, than the unmarried, and are more fixed in their pursuits and employments. In many other respects, also, the condition of married persons is much less favourable to the excitement of madness than that of celibacy.*

326. In taking a survey of the feelings, the emotions, and the passions, as well as of the numerous circumstances connected with the social states productive of insanity, the conclusion is irresistible, that the diminution of its frequency depends more upon the constitution of individual minds, proceeding from habitual control, and from a due exercise of moral and religious principles and obligations, than upon all other circumstances combined.

"Vain, very vain, the weary search to find
That bliss which only centres in the mind.
In every government, though terrors reign,
Though tyrant kings and tyrant laws restrain,
How small, of all that human hearts endure,
That part which laws or kings can cause or cure!
Still to ourselves in every place consign'd,
Our own felicity we make or find:
With secret course, which no loud storms annoy,
Glides the smooth current of domestic joy.
The lifted axe, the agonizing wheel,
Luke's iron crown, and Damien's bed of steel,
To men remote from power, but rarely known,
Leave reason, faith, and conscience, all our own."

327. VII. Of the Physiological Pathology of Insanity.—i. Remarks on Mind and Organization.—*A. Of the Scope of these Inquiries.*—The human frame respires, digests, thinks, will, and acts; in a few hours afterward, and often without any obvious cause, it performs none of these functions; and, in a few hours more, it falls into dissolution. These phenomena are familiarly known to us; and, although they are considered by all to form a part of the established order of the universe, yet they must have engaged the reasoning powers of man from an early period of his social history, and have been among the earliest subjects of philosophic discussion. As the cause of these occurrences is necessarily embraced by speculations as to the origin and nature of mental as well as of corporeal disease, so it may be supposed to have always been a matter of deep reflection to physicians from the earliest ages. The constitution of the human mind leads it to search after first principles, in order to explain the operations continually taking place within and around it; and the hopes of obtaining information respecting the source of the deranged states to which itself, as well as its associated frame, is liable, and even of discovering the nature of its own origin and connexions, seriously interest a class of inquirers whose occupation naturally suggests these considerations. Yet, although these inquiries more immediately concern the practitioner of medicine, especially as respects the more obvious changes which mind and its allied matter present to his view, still the intimate relations of both the one and the other, the nature of the connexion subsisting between both, and the more removed links of the chain which binds them to their first cause, and to the universal system of nature, are no farther disclosed to him than to any one else who patiently scrutinizes the objects which come under his view. As man did not create himself, so neither can the faculties with which he is endowed inform him, of themselves, even plausibly, either as to their own formation, or as to the original production of the frame which manifests them, or as to the connexions which the one has with the other, or even regarding the ultimate cause and circumstances of the apparent dissolution of both. How can the machine explain the principles of its peculiar construction, or demonstrate the views which actuated its Maker? How can we expect the powers of mind, which cannot be supposed to have been formed without a cause, to acquaint themselves of their own modes of being anterior to their present state

* [At Bloomingdale, 600 married patients had been admitted (1839), and 573 single; widows and widowers, 84; being in the ratio of 47¾ per cent. married, 45¼ per cent. single; 6¾ per cent. widows and widowers; corresponding very nearly with the ratio laid down by Esquirol.]

of existence! and how much less can they furnish information respecting the nature of that cause from which they necessarily derived their origin! They may, however, enable their possessor to recognise the phenomena which take place within and around him. They can mark the modifications and the sequence of operations characterizing their own constitution, and the properties of substances by which they are surrounded; and they may even expatiate beyond the objects of sense: still, the powers of human intellect, exalted as they are, can neither, through their own instrumentality, arrive at a knowledge of their own intimate nature, or of the manner in which they first came into existence; nor explain, satisfactorily, the kind of connexion which they hold with their first cause, on the one hand, or with the matter with which they are associated, on the other. Notwithstanding that the field is thus narrowed, it will be still found sufficiently extensive for exact research and profitable cultivation.

328. Although speculations respecting the nature and the material alliances of mind are sufficiently unprofitable, when directed to such topics as the above; yet, as they disclose points of great utility, when they are pursued in a different direction, they should not be altogether discouraged. It is to the medical philosopher that these points are especially manifested, and hence he becomes more particularly interested by discussions in which they are in any way involved. But, as his daily researches and occupations are apt insensibly to bias the opinions he may form as to those subjects, so his inquiries will often betray, upon strict examination, more of the *idola tribûs* than of exact deduction. Besides this important source of error, there are others, in which he partakes in in common with all inquirers. How very few physiologists are truly sound reasoners and exact philosophers! How often are the first requisites of valid argument overlooked, even at the outset of our researches after truth! How few among those who peruse the discussions to which these researches lead discover the sources of error! and how many are carried along with the sophistries which flow from these sources!

329. These objections, although strictly applicable to those topics to which I have alluded as being placed above the reach of our faculties, have, however, no reference to the correct observation of the healthy manifestations, and of the derangements of mind. The former topics, at the best, can be considered, from their very abstract, or, rather, inscrutable nature, as matters of curious speculation; the latter, being objects of consciousness and experience, are the true subjects of philosophy, and, from their involving the welfare and existence of human beings, are matters of practical importance in the scientific prosecution of our profession.

330. As our knowledge respecting life and mind can be derived only from a careful examination of the phenomena which organized bodies present—for we have no experience of the former unassociated with the latter—so our acquaintance with the manifestations of mind can be obtained only by an intimate investigation of the nervous system, and of its functions, in the higher animals and in man, and by attending to the objects of our consciousness. Of all the opinions which have been entertained as to the cause of vital phenomena, there is none in which these phenomena are not ultimately ascribed to one or other of two causes; namely, either to a certain organism of the materials of which the visible structure of the animal is composed, or to a principle totally distinct from, yet most intimately allied or associated with it; which principle seems to have suggested itself to all mankind, and to have received a distinct appellation. Opinions have necessarily been similarly divided as to the cause and mode of existence of the mental manifestations; the one being, that they result from the organization of the brain and nervous system; the other being, that, like vitality, they are distinct from the structures with which they are associated, and which are the instruments only of their operation. Hence, physiologists are divided on this subject into two classes; the one ascribing all vital and mental phenomena to organization; the other attributing it to a distinct principle—to vitality—allied to organization, in which state of alliance only is it subjected to observation, and made an object of investigation and of experience. Accordingly, the one class believes that the range and power of intellect entirely result from organization; the other considers that organization is only the medium or instrument of mental manifestation, while it continues to be actuated by life; that the powers of mind are the result of the vital endowment of the brain. Although opinions on this subject may be thus classed, according to their general and fundamental principles, yet they vary remarkably in their subordinate particulars, owing chiefly to their discursions beyond the range of consciousness and observation, and into the regions of imagination and wild speculation.

331. The functions of the brain, in connexion with the doctrine of life, have attracted the attention of philosophers from a very early period; and, during the last century, they have engaged the researches of some of the most acute inquirers who have "interrogated nature." The progress of our knowledge, however, in this very interesting but most difficult field, has not been equal to the growing zeal with which it has been cultivated. This want of success is entirely owing to the circumstances already alluded to—to the obstacles which beset us when entering upon investigations in which we encounter the mysterious union of mind with matter, and which relate to the more intimate states of both, and to their mutual influences in different and often in contradictory circumstances and aspects. The operations of the nervous system, possessing, as it does, so extended a connexion with the mental powers on the one hand, and with the corporeal functions on the other, and reciprocally receiving and communicating influence during health and disease, could not be accurately traced, even in the more evident phenomena, without some reference to the sources and relations of vital and mental manifestations; and hence have sprung up various and conflicting hypotheses, which have demonstrated little beyond the narrow limits of our knowledge and of our powers. These humiliating considerations obtrude themselves, when we view the numerous speculations which have been entertained respecting life and organization, and their relations to

mental manifestation, from the earlier dawn of philosophy to the present time, when we consider the conclusions to which many of them lead, and when we reflect upon the small progress that has actually been made in this department of knowledge. How little has been added even to the physiological part of these researches, notwithstanding the self-felicitations of some recent inquirers, since the writings of Galen! how much of what has been supposed to have been discovered still remains open to contradiction, cavil, and doubt! and what has the science of mind gained from the works of their modern followers in addition to what appears in the discordant theories of Plato, Aristotle, and Epicurus! It cannot be a matter of surprise that human intellect has been tossed for many ages upon an ocean of uncertainty respecting its nature and relations, seeing that it was never guided by any sound principle of philosophizing by which it might have been navigated into a safe haven. Until the philosophy of Bacon extended, in this country, its influence to the science of mind, but little care was taken to attend closely to the intimations of consciousness, and to investigate the nature, the extent, and the mutual relations of our faculties. The more precise attention which has recently been paid by some writers in this country to the objects of consciousness, and to the origin and history of our ideas, whether those which are derived from our senses, or those resulting from reflection, will serve to guide our speculations to conclusions more correct, and certainly more ennobling, than many of those are capable of accomplishing that have been entertained in modern times.

332. *B. The opinions of the ancients respecting mind and the vital phenomena* were sufficiently vague; and yet, when strictly examined, not much more so than most of the views promulgated in modern times. Ψυχη, *anima*, vital principle, or soul, according to some, were employed by them to express the cause of the vital actions, the term ζωη designating the effect of that cause. Democritus, Epicurus, and the Stoics considered the soul to be corporeal or material, but differed as to the matter constituting it. Hippo maintained that it was water; Democritus, that it was fire; Heraclitus, that it was a vapour, or exhalation; and the Stoics, that it was warm or ignited air. Of those who believed the soul to be incorporeal, some considered it mortal, and others that it was immortal. Thales said that it was the origin of motion, and always in motion; Pythagoras, that it was a self-moving monad; Plato, that it was conceivable only by the understanding, and Aristotle, that it was the first εντελεχεια, or element bestowing on others the possibility of life. The Manicheans imagined that there is but one universal soul, which is distributed in portions to all bodies. Plato and others maintained the existence of a universal soul, by whose influence all things existed, but that living creatures possessed separate souls, which have a threefold constitution: reason, placed in the head as in a citadel, passion in the chest, and desire in the abdomen. The Greek philosophers, who taught the immortality of the soul, generally believed in its transmigration. Galen, adopting the doctrine of Plato, considered the soul to possess three faculties, located in the three cavities of the body: a ruling or rational one in the head, a vital one in the thorax, and a natural one in the abdomen. These distinctions were long entertained in medicine, together with the subordinate faculties which Galen supposed to preside over particular organs, and which Harvey denominated *sensus proprii*, and Blumenbach, more recently, *vitæ propriæ*.

333. The Greeks, who believed in a vital principle, had long been accustomed to arrange its energies under different heads, as the φρην and the θυμος: the former implying the intellectual and voluntary functions, the latter the involuntary, which originate either in sensation or instinct. Some of their authors arranged the faculties of life under three heads, the νους, φρην, and θυμος: the first comprising the intellectual and rational powers; the second, those operations supposed to belong to the viscera of the thorax; and the third, those spontaneous functions termed organic or vegetative, belonging to the organs of nutrition placed in the abdomen. The Latin writers employed the words *mens*, *animus*, and *anima* in senses nearly corresponding with those attached to the terms used by the Greeks; although Lucretius, in his development of the Epicurean philosophy, is by no means precise in the use of them, and more generally employs *mens* and *animus* as synonymous terms, or very nearly as such.

[The ancient Greeks, moreover, assigned the peculiarities of the actions of the different organs of the body to their being the residence of several immaterial agents. The *Pastophori* first alluded to these as genii, or demons, or *decans* of the air, and their pupils of Greece believed them to preside, under the control of a great master spirit, over the functions of the several organs of the body. By Hippocrates and Galen, these were termed Δυνάμεις, and were considered to reside, one or more, in each organ, in subserviency to the grand Ενόρμων, or πνεῦμα, and to be the immediate cause of the peculiar function which it performed. Thus, according to Galen, the heart was the residence of three Δυνάμεις, the δυναμις διαστελλομενη, πιριστελλομενη, and συστελλομενη, or those by which it attracted the blood from the lungs, retained it for an instant, and propelled it through the body. The same thing was understood by Von Helmont, under the name of *Archæii insiti*, the number of which almost equalled the organs of the body, though all were held in subordination by one sovereign *Archeus*, corresponding to the πνεῦμα already mentioned, and supposed to preside in the stomach. Harvey also admits in each organ a *sensus proprius*, subject to the general *anima* by which the whole body was actuated; and Glisson speaks of each organ as possessed of a "*spiritus regius*, qui aliud in jecora, aliud in liene, aliud in pancreati, aliud in ventriculo, et intestinis operatur."]

334. Epicurus, according to the explanations of Lucretius, was the first who constructed a system of materialism. He ascribed organization, and the vital and mental phenomena displayed by it, to combinations of ultimate and invisible atoms, possessed of various shapes. He does not attempt to show how these shapes co-operate to form either an

animal or a plant. He merely asserts that the elements produce both from a combination of atoms, and that in his time many animals were formed, by showers and sunshine, out of the mud. This is one of the modes of spontaneous evolution contended for by some of the modern German physiologists. It being impossible to explain the manifestations of organization and mind, and, indeed, of the universe, by means of the doctrine of atoms alone, a being of superior power was introduced, and invested with great authority. This being, who belonged neither to atoms, nor to elements, nor to any of their properties, was called Nature. "Her existence," observes Dr. Barclay, "being found indispensable to all the hypotheses that exclude a deity, she is still preserved in her high office by many of the moderns, and invested with great power, incessant activity, and uncommon prudence. She creates and brings whatever lives to a state of perfection, and does it all according to method, or agreeably to laws imposed upon her by a higher power, which some call Fate, and others Necessity." We perceive the continual want which Epicurus and his followers experienced in their speculations of a first cause, one Supreme Being, to whom they might ascribe the various laws by which the world is governed; and we observe the manner in which his place is supplied by properties, powers, or principles, assumed by them to explain phenomena which, notwithstanding this assumption, must be ultimately referred to one great first cause.

335. Lucretius, the enthusiastic expounder of the doctrines of Epicurus, after attributing all things to the formative and productive faculties of his atoms, of earth, of the elements, and of Nature herself, thinks, nevertheless, that all must be regulated by diversities of seeds, or of organic particles, each endowed with a peculiar *secreta facultas*, which makes them both living and organic; he is also obliged to conclude that the soul is deduced from a seed—that it is from its seminal qualities, and from this radical difference of its faculties, and not from a difference of organism in the body, that the lion is fierce, the fox crafty, and the stag timid. He rejected the opinion of those who believed that animating principles organized animal bodies; and because he could not see how they did it, he therefore concluded that they did it not. Aware, however, that he might fairly be challenged, in his turn, to explain how his seeds were originally organized, he is quite at a loss, and, forgetting the mechanical properties of his atoms, has recourse to heat, air, and the invisible power of the wind, being, nevertheless, obliged to call in to his aid a certain mobile and active principle, that distributes motion and sensation to them all; but the origin of this principle he cannot explain. The opinions of Lucretius were evidently directed against the vulgar notions of the existence of divinities endowed with moral attributes; but they in no way influence the arguments in proof of a Deity, and a purer system of religion. He admits that it is impossible to disregard the religious feelings and impressions which are interwoven with the very stamina of our constitution; that no nation or individual is entirely without them; that some notions of divine beings are quite irresistible, and that they will spring up in the human mind as things indigenous, without the adventitious aid of education. "Quæ est enim gens, aut quod genus hominum, quod non habeat, sine doctrina, anticipationem quandam Deorum!"

336. *C.* Of Modern Materialism.—It has been urged by all the favourers of Epicurianism, and by many of the followers of Gassendi and Hobbes, but more especially by Buffon, Priestley, Darwin, Maupertuis, Blumenbach, Cabanis, &c., that, as the manifestations of mind are never met with, unless connected with a brain, and are suspended by compression of this organ, so the phenomena generally attributed to it are the result of its organization. That the combination and reciprocal action of the molecules of matter constituting the nervous fabric, of themselves, and unaided, produce the various powers of mind, is the proposition which they support, however paradoxical it may seem, but which they cannot explain. The possibility of such combinations and reciprocal actions of the molecules of matter producing, unaided, such results, is not shown by any analogy, or by any proof. If mind proceed from certain associations of organic particles, why has not some opinion as to the process been hazarded! Does our experience respecting the mutual influence of either the elements or the aggregate of matter furnish us with resulting phenomena that can in any degree approach to the lowest manifestations of either vitality or mind! If mind be supposed to be derived only from the combination of these particles, or from the operation of certain of their products upon each other, it may be asked whether it be possible to conceive that matter, in such a state, possesses qualities of which the elements, or even the individual atoms, are divested! and whether experience has furnished us with any instance of mental, or even of vital phenomena proceeding from such combinations when matter is removed beyond the influence of bodies or sources already endowed with life! If, on the other hand, properties necessary to the generation of the mental faculties be conceded to every particle entering into the formation of the encephalon, how can the idea of the subdivision of the powers of mind, to such an extent as matter admits of, be allowed! Can the supposition be for a moment entertained that every molecule of this admirable organ has a fractional part of mind connected with it! Many of the materialists, in order to account for the manifestations of mind, have had recourse to so many suppositions respecting the nature and endowments of matter, in respect either of its elements or of its aggregate, as were tantamount to a negative admission of the principle of vitality against which they had been arguing, with this notable difference, however, that they required the operation of numerous agents, instead of more philosophically referring these manifestations to states of this first and noblest constituent of our nature. The genius of Leibnitz saw the difficulty that stood in the way of pure materialism; and, in order to give the atoms of matter activity, and origin to the mental phenomena, he had recourse to the *εντελεχειαι*, or spirits of Aristotle.

337. Cabanis and the later French physiolo-

gists adopted the doctrine of organism; and, in order to supply the want of a foundation to their structure, they seized with avidity upon the opinions of Gassendi respecting the origin of our ideas. Their hypothesis still required support; and, in order that it might receive such from a name looked upon with deference throughout Europe, they unjustly imputed to Locke opinions which belonged to the two celebrated opponents of Des Cartes, already mentioned. Much of the credit which this doctrine acquired in France and in Germany arose also from the neglect with which that class of our ideas derived from reflection was uniformly treated—from the circumstance that the evidence of the senses and the information derived from experience were considered as the sole foundations of our knowledge. It is very justly remarked by Dr. Barclay, that if it be supposed that all knowledge is derived from the senses, and that matter is the only object of sense, it must be evident that, on this hypothesis, we cannot with propriety ascribe phenomena to anything but matter. But on what data is matter, in general, pronounced to be an object of sense? Its ultimate particles certainly are not so; and its aggregates, though many of them certainly are, seem but little calculated to account for life and organization, and, at any rate, they by no means account for their own formation. But, whatever may be their formation or their consequences, they must be ultimately referred to those primary molecules which are utterly beyond the reach of our senses. Besides, if matter be supposed to include a variety of substances, or, rather, everything that has an existence, it is, on this supposition, no explanation of a phenomenon to say merely that it proceeds from matter. He who hazards such an assertion should point out the particular species or the peculiar arrangement from which it proceeds, otherwise he gives us no information but that it proceeds from something unknown, and which he would wish to be called matter. We may, therefore, safely question the accuracy of the opinion that all our knowledge is derived from the senses; as well might we say that arts and manufactures are derived from the doors and windows of the houses by which the raw materials enter, to be afterward prepared by the industry and skill of the workmen.

338. As our senses are prior in existence to our experience, we have still more reason to question another opinion brought in support of materialism, namely, that all our knowledge is founded on experience, for a great number of our ideas are not directly derived from our own experience, but rather from the evidence of testimony. Besides, prior to experience, we possess a species of knowledge which, as to self-preservation, is much more essential than any that we afterward acquire, which seems to proceed directly from the Author of our being, and which, so far from being the result of our own experience and observation, is the very groundwork on which they are founded. Of this kind is the knowledge immediately derived from those natural instincts and feelings which regulate the various functions of our system, which stimulate our intellectual powers, and which, according to their strength or their weakness, their healthy or their diseased state, impart a character to our experience, our observations, our reasonings, our conclusions. When we wish but to move a limb, by what experiment or process of reasoning do we come to know the necessary muscles, the particular nerves proper to excite them, or the amount of energy to be imparted to each, so as neither to exceed nor to fall short of the object in view? If we may take a view of the instincts which guide animals to the selection of food suited to their digestive organs—to know the appropriate means to overtake, subdue, or ensnare other animals—to provide against seasons of scarcity by laying up stores—to know the distant countries and the different climates where food is in plenty, and to which they can migrate—to learn that they can sleep during the winter without any food, and to select their retreats so as to avoid discovery—to calculate the time of sexual intercourse, with reference to the periods of gestation, so that the birth of their offspring may coincide with the seasons suited to their early and future exigencies; if we consider the age at which most of these phenomena are manifested in the classes of animals to which they severally refer, and the circumstances with which they are generally associated, and if we analyze the entire class of our instinctive desires and feelings (see note, § 66), as manifested both in man and in the lower animals, we must necessarily infer that the sources of our knowledge are much more extensive than the supporters of organism would lead us to believe. Let us, therefore, as Dr. Barclay has well enforced, give due importance to these primary causes of action and feeling, for whatever our reasonings or opinions may be, we will find them linked with some one or other of these original springs or energies of our constitution—with some instinct, appetite, or passion—with some one of those sources of action, which not only are prior to all our experience, observations, and reasonings, but, what is more, are, during our lives, not unfrequently regulated by circumstances, external and internal, over which we have little or no control.

339. If such be the facts, what, then, it may be asked, is the use of experience, observation, and reasoning? The use of these in man is still great—great in proportion to the development of the intellectual powers. These, and the instincts, can, to a certain extent, mutually aid, oppose, and regulate one another, so as to preserve a juster balance in the moral and social system. The instincts, too, as well as the intellectual faculties, may be diseased, may be perverted, or may be deceived, as they have been shown to be in most of the forms of insanity; and in all cases where they point only to immediate objects, or act according to immediate circumstances, they give no warning of the snares, the troubles, and the dangers which are the consequences of indulgence. By following the impulses of instinct, to the neglect of experience and reason, passion and desire lead to acts of moral insanity. As we are able to ensnare, capture, or destroy the lower animals, by taking advantage of their unguarded, unsuspicious instincts, so we ourselves are often ensnared and captured, or ultimately even destroyed, by excessively indulging many of our instinctive desires and moral emotions, and by neglecting the dictates of experience, just rea-

soning, and rational observation; or, in other words, from a want of that discipline of which the instinctive and moral feelings are susceptible, and which we have the means of administering by possessing intellectual and reflective powers in a higher degree of perfection. The control of those feelings, however, is in proportion, not only to the perfection of these powers, but also to the use made of them.

340. I have been thus particular in noticing the opinions of Epicurus, because they have the same basis, and involve the same principles, as modern materialism; and in showing that the doctrine of Gassendi and Hobbes, which ascribes all our knowledge to our senses, and which has been seized upon by every writer of note who has more recently written in support of organism, is altogether unsound. The scope of this work allows me not to pursue farther this part of my subject, or to notice the several modifications of materialism which have been proposed in modern, and even in recent times. This is, however, the less necessary, as what has been already advanced will show the complete insufficiency of any theory based upon organism to account for the phenomena of life and mind.* But I am compelled to examine briefly a modern doctrine which has met with a very favourable reception both in this country and abroad, and which has been applied, by those who favour it, to the study of insanity—I allude to the doctrine of Gall, or Phrenology, or Cranioscopy.

341. ii. Of Phrenology.—Of this doctrine, I may observe generally, that some of its principles are founded on opinions which have been, and still are, very generally admitted by physiologists; while others, which especially belong to it, are assumptions, which even those who favour it cannot pretend to be proved, or at least expect to be admitted, by sound reasoners, as data sufficiently established. Those who support phrenology, appeal to facts, assert that it is eminently a science of observation and rational induction, and, with apparent candour, call upon those who oppose it to make themselves acquainted with its principles and details, and then to observe and judge for themselves. This seems rational; but, unfortunately, when the advice is followed, and when the results militate against their theory, they endeavour to rid themselves of the difficulty by asserting that the observer is mistaken, and unacquainted with the principles of their doctrine; thus virtually denying that any one can be acquainted with it, unless he be likewise a convert to a belief in it. When, however, pressed by facts which seem irresistible, they have so many ways of eluding the difficulty, and especially by means of their notions respecting the *activity* and *volume* of the individual organs into which they have divided the encephalon, and the development or activity of controlling, of opposing, and of co-operating organs, that there is at once an end of all argument with them. But the ability and eminence of many of those who have written in support of this doctrine, as well as the reception it has met with, and especially the very intimate relation in which it stands to the pathology and treatment of insanity, require that I should enter upon a more intimate examination of it.

342. That the seat of mind is the brain, is proved by a general consciousness that this is the case, or by a similar testimony to that of the locality of the various senses; and it may be farther proved by experiment—as by dividing any of the nerves, and by observing the resulting phenomena. The same inference is to be deduced from the injuries and diseases to which the brain is liable; by the different grades and forms in which the mind is disturbed, impaired, or its phenomena cease altogether. Whether we can more precisely assign the locality of the mind, or the localities of its different manifestations, than by saying, in general terms, that the seat of mind is the brain, is a question which has been long agitated; and it is upon the affirmation and negation of it that the believers and unbelievers in phrenology rest their doctrines. It was formerly supposed that the mind was located in the pineal gland; but, as no evidence of this could be adduced, and as it could not possibly be proved by experiment, or supported by observation in disease, the opinion shared the fate of similar hypotheses. That the several faculties and propensities of mind reside in respective portions of the brain, is the fundamental proposition of phrenology. But, as Dr. Pring (*Sketches of Intellectual and Moral Relations*, 8vo, London, 1829, p. 71) has well observed, if we seek for the same evidence in support of this proposition, which showed that the brain, in general, is the seat of mind, no part of it will be found. In our perceptions of the objects of sense—in the operations of mind—in the study of music, languages, mathematics, &c.—in the exercise of our passions or propensities—we have no consciousness of the portion of the brain brought into action; and we cannot thereby assign any of these to one part of this viscus, rather than to another, or distinguish whether the seats of these manifestations or states of mind are different, or the same for all.

343. The proofs of locality afforded by disease or injury are equally inconclusive, or, rather, are not to be found. Extravasations of blood in apoplexy will suspend the mental phenomena, or cause both them and life to cease, in whatever part of the brain they may occur. Whether such extravasation take place in the cortical, or in the fibrous structure, or in any situation; whether fluid is effused from the membranes, or into the cavities; and whether the organic effects of congestion, concussion, fractures, depressions of the cranial bones, inflammations, or softening of portions of the brain, or the development of tumours, be contemplated—we find only this common result, that all the phenomena of mind are more or less modified or suspended, or they cease altogether. They may, however, be almost unaffected by some of these lesions; or some faculties and propensities survive, while others are lost; still the preservation or the loss does not observe any regular connexion with the integrity or injury of any given portion of brain. But to state with more precision and detail the doctrine of Gall: It is asserted, 1st. That the mind presents a certain number of faculties,

* For an account of the various hypotheses which have been advanced to account for life and organization, see the work of Dr. Barclay on this subject, and two articles by the author in the 17th and 18th vols. of the *London Medical Repository*, 1822.

passions, and propensities, all of which are individually exercised by distinct portions of brain, which portions are the *organs* of these faculties or passions; 2d. That these functions are performed, in their respective seats, in different degrees in the same or in different persons; 3d. That the strength or perfection of these functions or faculties is in proportion, individually, to the *size* of the organ, and to the *activity* with which it performs its office; 4th. That these organs are situated in the superficial parts of the brain; 5th. That in proportion to their size is the protuberance of the skull over them; 6th. That by an examination of these protuberances, the size of the organs, and consequently the degree of perfection of their respective functions, may be estimated; 7th. That the individual functions may be developed or restrained by education; 8th. That the preponderance of one or more of them may be repressed by the cultivation of others; 9th. That the propounder of this doctrine was fortunate enough to discover the great majority of the situations in which the individual manifestations of mind are located, and that the rest have been since ascertained; and, 10th. That the system is applicable to the prevention and treatment of insanity, mental disorders confirming the truth of it. I proceed to remark briefly on each of these assumptions.

344. *a.* The enumeration of the faculties may or may not be correct. Some of them are not simple, or even original states of mind, but, as certain of the propensities, arise out of several, which more or less subserve to their individual formation. Then, as respects others which are considered original and connate, the sphere of action is either too extended or too limited, while no attempt is made to trace them to simpler and more original manifestations. The division of the faculties by the phrenologists, moreover, is such, that explanations of character conformably with it would lead us often to infer that an individual both has and has not a particular genius, faculty, or endowment, or that he possesses opposite endowments in equal grades of perfection and activity, or that, both being equally developed and active, the balance vacillates between them till some circumstance affects a related faculty, and thus causes it or its opposite to kick the beam. The division of the faculties is opposed to just views of philosophizing, and is altogether empirical.

345. *b.* That the faculties and propensities have their seats in particular portions of the brain, which portions are respectively the organs of the faculties and propensities, are two assumptions equally ill-founded with the foregoing. As the faculties of the mind are not distinct entities, but merely states or affections, arising out of impressions on the special or general sensibility, or different modes of consciousness, according as these impressions are internally and externally associated or related, so it is unnecessary to inquire whether these faculties have appropriate or respective seats in the brain. Our experience of what constitutes distinctness of function, in connexion with organization, does not permit us to extend the appropriation of function and organ to the mind and brain any farther than that our consciousness instructs us that the brain is the seat of mind, or the organ which is most intimately related or associated with its various states and affections; but it by no means informs us, nor even suggests, that these states or affections are the functions respectively of particular parts of the brain, or that these parts are the organs individually destined to perform appropriate offices. Having no proof arising out of our physical and mental constitutions, how then are we to obtain any, or is any conclusive evidence to be obtained? We cannot obtain it either analytically or synthetically, compatibly with the continuance of life. Evidence, therefore, of the loosest kind—analogies, merely, have been advanced in support of this assumption. As disease or injury has been found to destroy the functions of sense, when implicating either the origins or courses of their nerves, so it has been supposed, from this circumstance, that there are particular localities for the powers of the mind. But this, instead of suggesting the existence of such localities, merely indicates that the impression from distant parts, or distinct organs, is conveyed by certain nerves, which, when diseased or injured in any part from their origins to their terminations, are either rendered incapable of transmitting sensation, so as to become an object of consciousness, or transmit it in a state of disorder, or imperfectly. Without farther pursuing facts which abundantly suggest themselves to every physiologist and pathologist, it may at once be averred that the proofs in support of the localization of the faculties of the mind are not merely defective, but altogether wanting, and that the loose analogies which have been advanced are either inapplicable, or admit of various explanations, none of which come in aid of the proposition.

346. Even admitting that the powers or faculties of the mind exist as separate essences or functions, and that they occupy appropriate seats or spheres of the brain, it by no means follows that these seats are the *organs* which give rise to these powers. The viscera discharging specific offices are denominated organs, because they are the agents by the instrumentality of which certain results or phenomena take place when actuated by life; and we perceive a very obvious organization appropriated to the office performed in the liver, kidneys, lungs, heart, &c.; but we are unable to show by what arrangement of the substance of the brain a mathematical calculation, a process in algebra, a philosophical reflection, a cautious action, or a flight of imagination is produced. Indeed, the question whether certain states of mind, which the phrenologists have located in the brain, are really so seated, or should not rather be assigned to different parts of the nervous system, as they have been by most of the ancients, and by many modern physiologists, has not been duly considered by them, but at once have been assumed as *functions* of portions of the brain, which they have also assumed without any sufficient proof as *organs* individually appropriated to the performance of a certain function, and to that only.

347. *c.* It is asserted that the functions are individually exercised in different degrees of activity in the same, or in different persons; but is this owing, when occurring in the same person, to an accidental change in the state of

the respective organ? or is the organ under the control of volition? or both? How does volition act upon each of the numerous organs? how is it located so as to bring each or all into play? and does it run from one to another? or, seated in the pineal gland or somewhere near, does it reach out certain appliances with which it is provided to each, and thus strike them in every variety of combination? If volition acts upon one, it must necessarily act upon all or any intermediate number, in every possible mode of combination; and if this were the case, and the volition or desire comprehensive, how immense, both intellectually and morally, would be the result! If it be said that the will can act upon one organ only at a time, how then happens it that several must often be in operation to produce the effects which the phrenologists admit as often occurring? That persons may have talents for particular pursuits, or certain propensities in a greater degree than others, is one of the oldest and best established remarks respecting the human mind. Our experience, however, warrants only the expression that there is a stronger or a more favourable disposition in some minds to certain operations, propensities, and passions, than in others. But, as Dr. Pring has observed, that the existence of any one propensity or faculty is independent of all the rest, or requires to be spoken of as more than a disposition of that which is expressed in the gross as the mind, cannot be inferred, 1st, because the disposition which makes the propensity related with its objects has the character of a common principle; 2d, because the objects of a given faculty are presented to it through media—the senses—which are common to all the other faculties; and, 3d, because one ability is not perfect, or, in reality, does not exist without the concurrence, more or less extensive, of others. In truth, there seems little more reason for supposing that the different phenomena of mind are produced by numerous distinct faculties, than that it requires different hands to play different tunes upon a musical instrument.

348. *d.* That the strength of the faculty is in proportion to the size of the organ, is another fundamental proposition of the phrenologists; but an assumption, equally with the preceding, supported only by loose analogy. The only analogical proofs, indeed, which can be adduced in favour of it are derived from the muscular and nervous systems—and these do not fully apply to the brain; for it cannot be stated with truth, even as a general proposition, that muscular strength, either in man or in the lower animals, is in the ratio to the bulk of the muscles; nor is it universally true that the largest nerves convey the greatest degree of nervous energy, although they generally may be inferred to do this, since they are composed of a greater number of fibrils, each of which, or of the fasciculi into which they are arranged, transmits a certain amount of power, or, rather, of stimulus, to already inherent power in muscular parts. Moreover, sensibility, which is a principal property of nerves, is not manifestly greater or more acute in a large nerve than in a small one, or in a branch much less than a trunk. The phrenologists are themselves aware of the weakness of this part of their foundation, inasmuch as they have recourse to *activity*, or intensity of action, to explain phenomena which they cannot account for by means of volume. That the size and activity of function of the brain may be connected with the degree of mental manifestation, either singly or conjoined, may or may not be the case. The affirmative has been believed in for ages—chiefly from the loose analogies already alluded to, and from others presented by various organs or parts. Still, this is the only part of the system which retains any portion of plausibility upon a strict examination. The alternative, however, of size and activity is so readily resorted to against the opponents to the doctrine, and so easily suggests itself, as to preclude all argument respecting alleged facts in proof or disproof of the system, and to betray the mind of the espouser of it into a state of blind belief. It is obvious that, as long as size, relative and absolute, and activity and inactivity in every grade, are made bases of the doctrine, no fact, however faithfully observed, can be adduced that will shake the faith of those who have embraced it, although every one who will give these articles of their belief due consideration must come to the conclusion that they actually negative the propositions they are intended to support; for if activity of function be admitted as respects certain of the organs into which they have divided the brain, inactivity must be conceded to others, or even to the same organ on different occasions; and if these states are so important, why have recourse to volume or development as the principal indication of endowment or function? The shiftings between these states in argument respecting alleged phrenological facts; the influence of allied or related propensities or faculties on those which are most prominent or most deficient; the countervailing operation of opposing organs; and the different interpretation that may hence be put upon the *ensemble* of these organs as manifested by the cranium, must render the study, even if tolerably based in truth, as one, at the best, furnishing opportunities of vague guessings into character, in which no two speculators out of many may agree, or arrive at anything like a just conclusion.*

349. *e.* The localization of the organs, and, consequently, of the faculties, in the external or more superficial parts of the brain, whether suggested merely by a desire of detecting their volumes, or by the circumstance of these parts presenting a greater diversity of arrangement, or structure, or form, is immaterial, inasmuch as they both equally fail in supporting the assumption. That the superficial and cineritious portions of the brain are more intimately related with, or instrumental to the manifestations of mind, may or may not be the case. We have no proof of a conclusive nature, either one way or another, although various circumstances and considerations, not amounting to evidence, have induced several writers to suppose that these parts are actually more especially subservient to the mental powers. Yet, that two or three convolutions, or two and a half, or one and a half, or half or three fourths of one only, should be devoted to one faculty or propensity,

* The author, before he was much known as a writer, had his head examined by several of the most eminent phrenologists of the metropolis, but there was no near agreement between any two of them as to his disposition.

while the next convolution, or those severally surrounding the portion thus devoted, and even the fractional parts of convolutions not belonging to that portion, should be very differently, or even oppositely employed, the ultimate arrangement of structure being the same in all, is certainly, if not the extreme flight of imagination, at least the highest pitch of hypothetical conclusion. Numerous other arguments may be adduced against this assumption, but they seem quite superfluous.

350. *f.* That the protuberance of the cranium marks, and is proportionate to, the development or size of the particular organ of the brain underneath, often obtains, but not universally, or even generally. But this concession in no way supports the general doctrine, even although the protuberance of the cranium truly and constantly expressed the volume, or, rather, prominence of the part of the brain underneath. However, this correspondence very often does not exist, even in early life, for reasons that will suggest themselves to every anatomist. We find, moreover, and not infrequently, that there are prominences in the cranium where there are underneath no corresponding development of brain; and that the skull is impressed internally by irregular enlargements of the convolutions of the brain, and yet no external projection can be observed corresponding with the concavities in the internal surface. But the phrenologists contend, as we have seen, that the size of an organ is in proportion to the strength of the faculty; and, farther, that a faculty, not naturally very strong, may be greatly strengthened by education or habitual exercise, even at advanced periods of life. Now, it may be asked, is it to be expected that, at adult or advanced age, as the faculty gained strength, and as the organ, as they suppose, becomes increased in volume, the portion of cranium placed over it will be protruded before it, so as to indicate the amount of increase? None but phrenologists could even dream of such a change as this in the skull at these periods of life. Here, however, they may shelter themselves behind activity instead of bulk, or, if they still stick to the latter, and it evidently appearing that the bone does not yield to the growth of the subjacent organ, either the organ itself or those around it must be damaged by the consequent pressure—those in the vicinity must be atrophied in proportion to the hypertrophy of the exercised part, and their functions injured accordingly, or even altogether annihilated.

351. *g.* It is evident that the proposition directly based on the foregoing—namely, that the strength of the faculties may be estimated by an examination of the projections and depressions of the skull—requires no farther remark. That faculties and propensities may be developed or restrained by education, is, and has long been, admitted within certain limits. That the faculties acquire facility of action from exercise, provided that the exercise be neither excessive nor too long protracted, has been generally allowed. The passions and propensities, also, acquire strength from indulgence; but this is not regularly or universally the case; for, as remarked by Dr. Pring, a passion which, in the earlier periods of its gratification, was vehement, might give place, after continued indulgence, to an apathy with respect to the same objects; and, in other instances, the excessive indulgence of almost any passion or propensity may terminate in disorder of it, or even in its imbecility or total extinction. That the predominance of one passion or faculty may be restrained by the cultivation of another is an old observation, which is not so universally correct as generally supposed, but which is received as an established axiom by the phrenologists, as it agrees with the belief in the distinctness of the individual mental functions and of their respective organs. As respects the passions, we generally observe, that when certain feelings are frequently called into action, those which repress them, or are incompatible with them, are inactive, and less disposed to manifest themselves. This, however, does not extend to the purely intellectual powers; for, as regards them, we do not find that the cultivation of one power enfeebles the others; it merely tends to the formation of opinions unfavourable to the employment of another power. All that our existing knowledge permits us to advance on this topic is, *that certain modes or states of conscious sensibility or mind, being called into existence and action by their respectively related internal or external causes or occasions, these states continue to manifest themselves with an activity generally corresponding with the intensity, character, repetition, and duration of these causes; and that a disposition thus to manifest themselves exists in proportion as they have been called into action or thus exercised, other states of mind becoming inactive from the absence or insufficiency of those causes or occasions which are especially related to them, but assuming activity whenever these causes come into operation.*

352. This proposition is equally applicable to the intellectual faculties, and to the propensities or passions—to imagination, and comparison, and reasoning—to the benevolent and to the malevolent emotions; and is aptly illustrated by Dr. Pring, who remarks, that a disposition to cruelty may be repressed for many years by a cultivation of the sentiments of benevolence, &c.; these sentiments may prevail until the age of thirty, when, from injurious treatment, or unfavourable observations of human nature, it may be suggested, that mankind are altogether unworthy objects; that they merit hatred rather than love; that, instead of the kinder offices, no species of cruelty is too bad for them. The original propensity would then be resumed, perhaps, even in greater force, from the contrasted sentiments which had been previously entertained, or from having been so long repressed.

353. *h.* It is obvious that, before the seats or organs of the faculties and propensities can be respectively assigned in the brain, it must be shown, *first*, that these faculties are severally distinct; and, *secondly*, that each occupies an appropriate and equally distinct portion of the brain. These propositions, however, have been already examined, and rejected for want of proof. Notwithstanding this, the phrenologists assert that those persons who have certain faculties and propensities in a high degree have certain protuberances on the skull by which these faculties are denoted, these protuberances being the external signs of the cerebral organs, and of their respective offices; and they support this assertion by the formation of the

crania of those who had certain faculties and propensities in an unusual degree—these crania, as they aver, all having a protuberance for the same faculty in the same part or situation. But this practical application of their doctrine, upon the truth of which its utility entirely depends, altogether rests upon the facts which have been adduced in support of the proposition that the same faculties are always indicated by the same external signs, in respect of situation and development. The number and correspondence of the facts, however, are denied by those who do not believe in phrenology. It is obvious to those who think that all physiognomical systems—that all attempts to establish a doctrine by which the character shall be known from the external appearances of even a part, or of the body generally—may be supported, however *bizarre*, by a certain number of coincidences, which may be viewed as facts proving its truth. When we take into account the number of the mental affections and faculties, the diversity of intellectual and moral character, and the endless varieties of form of the head, face, and body, and of their expressions, it must be obvious that any theory in which there is a reference of faculty to form will necessarily find support in a large number of coincidences—it cannot possibly be otherwise; and if these coincidences be assiduously sought after, recorded, and marshalled as proofs of its truth, to the neglect of facts which disprove the connexion attempted to be established, the theory will appear to many, and especially to those who are seldom at the trouble to think for themselves, a most brilliant discovery—and the more so, that it promises an almost intuitive knowledge of character, and the most useful practical application. It is not denied that some skulls present, in connexion—but, as far as the thing is yet proved, only in coincident connexion—certain propensities and faculties with certain external signs; nevertheless, it is confidently averred that others evince no such correspondence between the mental character and the external form, and even contradict it in all, or in the most remarkable of their respective parts. In the alternative, however, of activity, the cranioscopists have a refuge from adverse facts—and, as I have already hinted, from sound argument; and behind this and various circumstances, as controlling, deficient, inactive, and concurring organs—they endeavour to intrench themselves. There are numerous other circumstances and considerations which strongly militate against the doctrine of GALL; but the scope of this work will not permit me to adduce them. The reader will find this topic more fully treated of in the able work of Dr. PRING, already referred to.

354. *i.* The applications of cranioscopy to the pathology and treatment of mental derangement that have been made by those who believe in it cannot be entertained; for as it appears, from the reasons assigned above, and from others that might be adduced, not to be based in truth, such applications of it can only mislead, or interfere with juster views, or even be productive of irreparable mischief.

355. Having thus disposed of a doctrine which has received very considerable support, and which has been viewed by those who entertain it as being of the greatest utility in understanding and managing mental disorders; although, even if most firmly based in truth, the utility of it in this respect is neither so great nor so obvious as they would wish it to appear; it farther remains briefly to consider the probable nature of the connexion of the mind with the brain and nervous system.

[It was a remark of the profound and sagacious CUVIER that, as "certain parts of the brain attain in all classes of animals a development proportional to the peculiar properties of these animals, one may hope, by following up these researches, at length to acquire some notion of the particular uses of each part of the brain." This philosophical mode of investigating the physiology of the brain has been attempted by the school of modern phrenologists, and, it is believed, not without some degree of success. Believing that the functions of the brain could only be established by an appeal to facts, these have been assiduously gathered on every side, so that, by means of busts, charts, museums, collections, lectures, and published essays, a belief in the doctrines of GALL pervades every part of the civilized world, and in our own country embraces a very large proportion of the population. We have no desire to enter here on a defence of phrenology, so called, for we are yet to be convinced of some of its doctrines; but we may remark, that to oppose it with success requires a specification of facts and details, not a general statement that the experience of the writer is against the alleged concomitance of mental faculty and cerebral organs; for a multitude of positive observations cannot thus be got rid of. Facts, we believe, will warrant the belief that the brain consists of a plurality of parts, or organs, each performing a distinct function; although the parts concerned in each function may not all, as yet, have been correctly ascertained, we can scarcely avoid such a conclusion, when we see how the brain receives successive additions as animals rise in the scale of intelligence—how its successive parts are successively developed, as the human being advances from the fœtal to the mature state; not simultaneously, as a unit would be, but irregularly; when we regard the phenomena of partial insanity and injuries of the brain, attended with a partial affection of the mental powers, and many other facts, known to all whose attention has been called to this subject. Considered as the organ of the mind, we suppose few will deny that it may be divided into three great regions: the first, comprising the anterior lobes, and serving for the operation of the intellectual faculties; the second, comprising the coronal region, and more immediately connected with the moral sentiments; and the third, comprising the posterior lobes and base, and serving for the manifestation of the propensities common to man with the lower animals. Many of the principles of phrenology are common to it and physiology in general; but the proposition that organic size is, *cæteris paribus*, a measure of functional power, is peculiar to phrenology, and lies at its very foundation. No phrenological writer claims that size *alone* is a measure of the functional power of an organ, but that it is only when other circumstances are equal. This principle pervades the whole science of comparative anatomy, as well as animal physiology, and it is not

to be supposed that the brain forms the only exception to the rule. Camper's facial angle assumed this principle as its basis, against which, we believe, no objections were offered until the wider generalizations of Gall attracted the attention of the scientific world. Cuvier lays it down as an axiom, "that there are always certain relations between the faculties of animals and the proportions of the different parts of the brain," and remarks, that "their intelligence appears to be always great in proportion to the development of the hemispheres and their several commissures." When the phrenologist maintains that size alone is not a measure of power and intensity, he merely adopts and carries out a law, which is admitted to apply to all other organs, namely, that the power of the brain may be defective from disease, original malformation, or defective constitution; just as we see large muscles in persons of little strength, in lymphatic and relaxed constitutions, and where due nervous energy is wanting. Whether observations can be so carefully made and so extensively repeated as to establish on an immoveable basis the generalizations of Gall and Spurzheim, may, perhaps, admit of doubt; and yet we suppose it will be admitted that there is no other mode of settling this question but by carefully observing large numbers of cases, in which the same part of the brain predominates in size over all the other parts, and ascertaining what particular quality of mind is exclusively in excess in the same individuals. If we cannot in this manner obtain any clew to a knowledge of the functions of the brain, it is difficult to perceive in what manner we are to arrive at it. Whether, then, we consider phrenology as an exposition of the physiology of the brain, or as a theory of the philosophy of mind, it seems equally worthy our investigation, the first, to be determined by careful observation of the concomitance and connexion of certain functions with certain portions of the brain; and the latter, by the facility and consistence with which it explains mental phenomena, and admits of practical application to the purposes of life. It is worthy of note, that some writers, who reject the doctrines of phrenology, yet inadvertently admit some of its fundamental doctrines, as, for example, that the several faculties and propensities of the mind reside in respective portions of the brain. Thus, Fletcher ("*Elements of General Pathology*," Edin., 1842, p. 431) remarks, that "the various forms of hypochondriasis and monomania can be explained only on the presumption, that, in each, *a certain part of the brain*, the seat of that form of thought, the excessive energy of which gives rise to the prevailing delusion, is preternaturally excited, and in a state, probably, of chronic inflammation. Thus, an over-excitement of the organ of form, size, colour, &c., may conjure up to the imagination of the hypochondriacal, not merely spectral illusions, of the fallacy of which he is conscious, but forms and modes of personal existence, by which the impressions derived from the senses are more or less obscured, and they become stamped with the impress of reality; and a similar over-excitement of the organs of destructiveness, pride, caution, veneration, &c., may, in like manner, cast over the monomaniac the prevailing crotchet under which he labours. Such, then, appear to be the chief peculiarities of the faculty of thinking, dependant on a preternatural excitement of certain parts of the brain; and it is easy to understand that too little excitement of these or other parts may equally give rise to a defect of certain natural faculties and propensities. Thus, some persons have no sexual desire; others, no love of offspring, nor of country—no spirit, no pride, no anything," &c.—(*Loc. cit.*)

Assuming then, as ascertained facts would seem to warrant, that the brain is not only the organ of the mind, but that the manifestations of every primitive faculty depend on a peculiar part of the brain, it follows, as a matter of course, that we must look for the cause of insanity in the brain, and the cause of the deranged manifestations of every special faculty in a peculiar part of the brain. We are to look, then, we suppose, for physical changes in the organ of the mind, and not for disease of the mind itself, as the proximate cause of mental derangement; for, as Spurzheim has well remarked, the idea of derangement of mental functions must not be confounded with mental disease; the manifestations of the mind may be deranged, but it is difficult to imagine any disease or derangement of an immaterial being itself, such as the mind or soul is. Theologians and metaphysicians, who believe in the non-dependance of the mind on material organs for its manifestations, are not, perhaps, aware that they concede the mortality of the soul itself; for if it can fall sick, it may, doubtless, also perish. It is a much safer doctrine, that in this life the mind and body are inseparably connected; that the manifestations of mind are dependant on certain corporeal instruments; that they cannot appear without them; and are modified, diminished, increased, or deranged, according to the condition of these instruments, or organs. That the proximate cause of insanity is always corporeal, would appear to follow from considerations already adduced, namely, that it is often connate and hereditary; that it is influenced by age, sex, climate, season, and weather; that it is brought on by injuries of the head, and various other causes which affect the body, as pregnancy, too rapid growth, stimulating drinks, masturbation, long fasting, &c.; that it is periodical, and has exacerbations; that it is often accompanied, or alternates with other corporeal diseases; that it causes disturbance of sleep; is influenced by temperament, &c.: moreover, as has been observed, if the mind itself were diseased, it ought to be cured by reasoning. The character of individuals is also often entirely changed by blows, or other injuries, inflicted upon the head, as well as by diseases affecting that organ. Dr. Brigham, in his late work, entitled "*An Inquiry concerning the Diseases and Functions of the Brain, the Spinal Chord, and the Nerves*" (New-York, 1840), thus sums up what he believes to be the ascertained functions of the brain: 1st. That the cerebral lobes, or the hemispheres of the cerebrum, are the seat of intelligence; 2d. That the cineritious portion of these lobes, probably, is the seat of the mental faculties; 3d. That the fibrous or medullary portions of the brain are connected with the motive powers, and transmit volition and sensation; 4th. That the lobes of the cerebellum

are not connected with the manifestations of the mental powers, but are with the motive, and appear also to be with the sexual propensity, and that the sympathy between them and the stomach is intimate; 5th. That all the faculties of the mind may be manifested by one hemisphere of the brain; 6th. That different parts of the brain have different functions, and that the anterior portion of the cerebral lobes play the most important part in manifesting the mental powers, and appear to be the seat of the memory of words, events, and numbers; 7th. That the striated bodies and the thalami are intimately associated with the motive powers of the extremities; 8th. That parts in the middle and at the base of the brain, such as the fornix, corpus callosum, septum lucidum, pituitary body, and pineal gland, are not connected with the mental faculties.—(*Loc. cit.*) To these might be added, that the corpora striata and their anterior radiations preside over the movements of the lower, and the optic thalami and their radiations over the movements of the superior extremities. The above deductions have been derived from pathological investigations, and are worthy of candid consideration.*

The objections brought forward by our author to the main conclusions of the phrenologists, although plausible, do not seem to us irrefragable. We suppose it will now be generally admitted that there are no insuperable difficulties in the way to prevent the size and configuration of the brain from being pretty correctly ascertained during life by observing the outward form of the head. The want of parallelism between the tables of the skull and the existence of the frontal sinus, except in the case of two or three of the smaller organs, are now known to influence the results too slightly to affect the important conclusions of phrenology, and are consequently abandoned as valid arguments against the science. All observations made during old age or disease, were rejected by Gall as inconclusive, and though affording valuable illustrations, have never been received as valid proofs by any of his followers. Farther observation, and the accumulation of a greater number of facts, are still wanted to place phrenology on a secure and permanent foundation. We bespeak for it an impartial investigation on the part of medical men; for, as there is no branch of scientific inquiry that has been more misrepresented, ridiculed, and calumniated by enemies, so there is none that has suffered more from the weak and injudicious support of its friends.]

356. iii. Of the Connexion of the Mind and Nervous System.—*A.* Those who have reasoned against the possibility of the existence of the mind separately from the body have referred to the general agreement of the state of the former with that of the latter, and to the effects produced in the manifestations of mind by disease and injuries of the brain, as proofs of the truth of their doctrine. But the inferences drawn from these two classes of facts, as Dr. Prino justly observes, are by no means legitimate. As to the first class of facts, showing a correspondence of vigour at different periods of life, between the mental powers and the corporeal functions, it may be remarked, that the changes in these severally, although to some extent simultaneous, are not so universally, nor always in corresponding degrees: the faculties of the mind are sometimes unimpaired at far advanced periods of life, and the brain is fully developed long before the mental powers are in full vigour. Admitting, even, that the progress of the mind from infancy to old age is in general agreement with corporeal development and strength, yet it does not *on this account* follow that the changes of the mind in the course of age are *dependant* upon those of organization. There may be a simultaneous development without a necessary dependance. Besides, if the mental powers are entirely owing to the brain—are merely functions of this organ—wherefore are they not displayed at an equally early period of life with those of the liver, stomach, and other organs, all of which manifest a perfection of function, either soon after birth, or, at least, long before the mental powers are fully developed? According to the doctrine of organism, no answer to this question can be given; while those who believe that, in the present state of our knowledge, it appears impossible for matter to give rise, of itself, to life or mind, and that a principle of vitality is necessary to the attraction of material or inorganized molecules into specific organized forms, and to be allied and associated with them for the purpose of enabling them to discharge appropriate functions, will readily respond, that in the early part of their existence the brain and nervous system are the instruments chiefly, under the dominion of life and mind, of sensation, and of the instinctive feelings and emotions; and that, as fast as the mind is stored with the reports of the senses—as fast as conscious sensibility is called into action, so as to form perceptions, and to perfect the results of sensation—so it becomes also capable of retaining and comparing the objects of its consciousness, of reasoning and reflecting upon them, of suggesting new forms or combinations of them, and of drawing inferences from various sentiments or feelings arising out of the internal and external causes or occasions which influence or excite it.

357. The class of facts, consisting of modifications or suspensions of the mental powers,

* [According to Solly, one of the ablest anatomists of the age, and who has recently adopted the doctrines of phrenology, as founded in nature (*The Human Brain, its Configuration, Structure, Development, and Physiology*, &c. Lond., 1836), the functions of the cerebro-spinal axis are as follows: The *spinal cord* has a two-fold office, first, it is a conductor of motion and sensation, the anterior columns being the organs of motion, the posterior of sensation; 2d, it is a centre from which power emanates, independently of the great cerebral ganglia, with which it is connected. The office of the *corpora olivaria* is to preside over the functions of the respiratory muscles. The *posterior pyramidal bodies* are devoted to the function of hearing; the *optic ganglia*, or *quadrigeminal tubercles*, to that of vision; the *olfactory ganglia* to that of smell; and there is every reason to believe, that the impressions received by the extremities of the auditory nerves in the one case, and by the optic and olfactory in the other, are converted into sensations in the respective ganglia in which they terminate. The *cerebellum* is one of the centres which influence and generate power, and most probably in connexion with the functions of the voluntary muscles. The *pons varolii* is the commissure, or instrument for establishing a communication between the different parts of the cerebellum. Moreover, from the fact that it has a quantity of cineritious matter distributed through it, it is believed to be, also, a generator of power of some kind, of the precise nature of which we have no knowledge; and, lastly, individual portions of the great *hemispherical ganglia*, or cerebral lobes, perform separate offices in correspondence with the different kinds of mental manifestations, as stated by phrenologists.—(*Loc. cit.*)]

from organic lesions and injuries of the brain, has been considered by the supporters of organism as conclusive proofs that the mind is a function merely of this organ that can exist no longer when the fabric of it is destroyed. But it by no means follows that, because those powers are destroyed by disease of the brain, they are, therefore, the product of the organization of this organ. All we know is, that a certain degree of soundness of the latter is usually necessary to mental sanity, and that the mind shall be, in one case, severely disturbed by a slight change of structure; in a second case, but slightly disordered by most extensive disorganization; in a third, unaffected by very remarkable lesions; and, in a fourth, most violently affected, without any appreciable alteration. Here, although the facts contended for are numerous, yet they neither correspond with one another, nor do the lesions produce corresponding or co-ordinate effects on the mind; nor are the modifications of mind always to be referred to morbid conditions of the brain—the results are neither uniform, nor correspondent, nor universal—and hence the intimate dependance of mind upon the brain is not a legitimate inference from this class of assumed facts. The dependance of one thing upon another, it should be recollected, may be of different kinds: 1st. It may be that of absolute cause and effect, the latter existing only in consequence of the former, and ceasing with it. 2d. The dependance may be one of association or connexion, in which state the one cannot be manifested without the other, and any disturbance of either will have a reciprocative influence. The dependance may be either of the foregoing kinds, and be greatly affected by the contingent interference of a third, or foreign influence, not requisite to the existence of either, and especially of that which suffers a change from such interference. While it is the first of these that is contended for by many, the second appears to be the kind of dependance that naturally subsists between the mind and the brain, the contingent interference of morbid action in the brain disturbing the states of the mind, and the structural conditions of the brain itself.

358. The exercise of the faculties of the mind is dependant upon a cause which is allied with, or which actuates the brain, and is modified or suspended in consequence of disease or injury of the brain, not because the integrity of this organ *produced* these faculties, but because the exercise of them is prevented by the foreign influence of a preternatural state of the organ with which they are allied. On this topic, Dr. Pring justly remarks that, in the case of disease or injury of the brain, followed by suspension of the functions of the mind, we do not know the agents or the mode by which such suspension is produced. We perceive a change in the condition of the structure, but whether the action of the mind ceases because a material arrangement is disturbed, upon the precise state of which the action of the mind depended as upon an essential cause, or whether this action ceases because it is impeded by the foreign or preternatural influence of a fabric with which it is allied, we are precluded the discrimination of experience. Yet the alternatives have this important difference, that, in the former case, the mind cannot exist without a precise arrangement of a material structure; in the latter, it may exist independently of such organization; and, although liable to be disturbed or suspended by change of organization, in the same manner as any other effect may cease under a foreign influence, yet its exercise may be resumed when this influence is withdrawn.

359. The dependance of the mind upon the organization of the brain is said to be most unequivocally shown by the effects of *compression* of the organ; but compression, like organic lesions, may impair or suspend the manifestations of mind, whether they are a result of a certain state of organization, or whether they are only allied or associated with it. In the former case, the effect is one of necessary dependance upon its cause, the function ceasing upon a certain preternatural condition of the organ; in the latter, the foreign interference disturbs or suspends the condition of the material fabric with which mind is associated, and as soon as this interference and its material consequences are removed, the manifestations of mind are restored more or less completely, according as the removal of the foreign cause of disturbance is complete.

360. It follows, from what has been advanced above, that disorder or suspension of the manifestations of mind, from disease or injury of the brain, is no proof that the mind is necessarily a *function*, or an effect or product of this organ; but merely that the brain is the organ, instrument, or medium of communication between the mind and the external world.

361. In favour of the belief that the mind is independent of the material fabric with which it is intimately allied or associated, or is a result of vital properties superadded to and actuating this fabric, numerous considerations and satisfactory evidence, if my limits could permit, might be adduced; but it may be remarked, 1st. That the circumstance of the opposite doctrine, or that of organism, having been found fallacious and untenable, the only other doctrine by means of which the phenomena of mind and organization can be explained appears the more entitled to credit; 2d. That mind ceases to be manifested in consequence of an organic lesion in a particular or limited part of the brain—if the mind were the result of the organization, there is no reason why it should not still be produced wherever the organization is perfect; 3d. That the principle or properties of life, endowing living animals from conception to death, and the structures which life endows and actuates, are undergoing a perpetual change, and, as existence advances, a perpetual consumption, without any loss of identity; that both the original vital endowment, and its associated structures, are perpetuated from inorganic or from broken-down vegetable or animal substances, as from their elementary sources, these substances containing the constituent properties or elements of life and of structure; that this conversion and appropriation of the elements of life and structure are performed by the changes produced in, and by the affinity or attraction exerted on these elements contained in dead or inorganic substances by life; and that this attraction is one of assimilation, by which a living principle

separates, adopts, and unites its own properties or elements, and those of its allied structures, from the various materials furnishing them, thereby perpetuating their forms, as long as their own identity or existence is preserved, and as long as their elements are submitted to the influence or brought within the sphere of the vital endowment or principle, which alone is capable of thus acting; 4th. That it is observed of *functions* generally, that they are the results of life in conjunction with structure—of organization built up and actuated by the vital principle endowing it; that the function of every organ is dependant upon the continuance of its life; that it is not produced by the organization—for the material elements composing the individual tissues and the general organization are held together in a state of affinity or attraction and cohesion opposed to that which their chemical affinities dispose them to assume; that this predominant affinity and cohesion are owing to a vital endowment, and are therefore aptly denominated vital; and that, while it thus holds the material elements in a due state of attraction, appropriately to the constitution of the several tissues, it also enables them to discharge specific or peculiar offices or functions; 5th. That, this dependance of functions upon vitality existing throughout the body, a similar dependance of function upon vital endowment may reasonably be extended to the brain; and, 6th. That the evidence we possess as to life being the cause of the organization of material elements, and of its own perpetuation or renewal, as well as that of its allied structures; and as to its being a principle superadded to, intimately allied with, and actuating a material fabric, and of which evidence such notice as the scope of this work will permit has been taken above (§ 336, *et seq.*), and in the article Disease (§ 2, *et seq.*), is sufficient to show that the mind is the result of the vital endowment of the brain, without which endowment this organ would not only cease to be the instrument of mental manifestation, but would also fall into dissolution; its material elements, no longer being held together by the attraction of life, assuming those forms to which they are chemically disposed. According to this view, the evidence in favour of the immateriality of the mind is the same as that upon which the doctrine of vitality, or the primary agency and controlling influence of life upon structural arrangement or organization, and upon function, is based; and mind thus appears the highest manifestation or property of life, in connexion with, and through the instrumentality of the brain—that particular congeries of tissues, in alliance with which only could its wonderful faculties become apparent.

362. Matter is known to us only by our senses; mind, by our consciousness. We know quite as little about the essence and occult qualities of mind as we know of matter; and, as far as our most profound conceptions of them can carry us, we have no ground for believing that they have anything in common beyond their derivation from parents, and the support or renovation they derive from surrounding media and materials furnishing the properties and elements of their development, perfection, and perpetuation. The principle which thinks, as Dr. Abercrombie remarks, is known to us only by thinking; and the substances which are solid and extended are known to us only by their solidity and extension. When we say of the former that it is immaterial, we simply express the fact that it is known to us by properties altogether distinct from the properties to which we have given the name of matter, and, with the exceptions just adduced, has nothing in common with them. Beyond these properties, we know as little about matter as we do about mind; so that materialism is hardly less extravagant than would be the attempt to explain any phenomenon by referring it to some other altogether distinct and dissimilar—to say, for example, that colour is a modification of sound, or gravity a species of fermentation.

363. We have, in truth, the same kind of evidence for the existence of mind that we have for the existence of matter, namely, that furnished by its properties; and of the two, the former appears to be the least liable to deception. Of all the truths we know, says Mr. Stewart, the existence of mind is the most certain. Even the system of Berkeley, concerning the non-existence of matter, is far more conceivable than that nothing but matter exists in the universe. To what function of matter can that principle be likened by which we love and fear, are excited by enthusiasm, elevated by hope, or sunk in despair? These and other mental changes may be equally independent of impressions from without, and of the condition of the bodily frame. In the most quiet state of every corporeal function, passion, remorse, or anguish may rage within; and while the body is racked by the most distressing maladies, the mind may repose in tranquillity. The mind thus being so frequently uninfluenced by the state of the bodily organs, and so dissimilar and distinct from the functions of these organs, what reason have we to believe that it is dependant upon organization, farther than in being intimately allied with it, for the purposes of intercourse with the external world? When these purposes are fulfilled, this alliance is divorced; and as *mind*, the highest grade of vital endowment, is insusceptible of decay, although liable to be variously disturbed by diseases of its allied fabric, the connexion ceases generally, in consequence of the state of this fabric having become incompatible with its manifestation. As soon as the *organic life*, or lower grade of vital endowment, or the properties of life actuating the organs of digestion, assimilation, circulation, respiration, and nutrition, and giving rise to functions subservient to the display of mind, by means of the brain and nervous system, cease to be exerted on their respective organs, the vital cohesion of all the structures ceases, and changes take place in the arrangement of their constituent elements. These structures, however, are not annihilated; their elements have only changed their forms; thereby furnishing an analogical proof, as remarked by Dr. Brown, of the continued existence of the mind or thinking principle—that it survives the disorganization and changes experienced by its allied fabric, by means of which its properties or powers are displayed, and the various relations subsisting between it and the rest of the creation are established and preserved.

364. *B.* If we endeavour to inquire into *the origin of mind*, all the information which our

faculties enable us to obtain amounts merely to the following: that, in common with the other properties of life of which the structures are possessed, it is derived from parents; is developed by the changes in the constituents of the ovum; is matured by the processes of growth; is allied with an appropriate organization, or material fabric; and, like the other vital properties, subsequently manifests the phenomena which result from its own nature, and the agency of related causes. It is alone sufficient to establish, as Dr. Pring well remarks, the derivation of the mind from parents; that the being who exhibits the possession of it is a production from parents; that he is so endowed by an internal conformation; the materials of which are obviously from parental sources; and that he is not cotemporary with parents, but is a production peculiar to a more or less advanced and perfect period of their existence. The peculiar features, also, of the mind of the offspring are often found to resemble conspicuous ones which belonged to the parents; or, like the hereditary peculiarities remarked in the structures, the mental characteristics of parents are not manifested in the succeeding generation, but remain latent, and are displayed by the one which follows. Thus, insanity is as conspicuously transmitted from the parents to the offspring as any one of the hereditary corporeal diseases. The association, however much or little, with the good or with the bad, with the well-informed or with the vulgar; the being familiarized with scenes or sentiments which captivate the imagination, or with topics which exercise the reason; or confinement to a sphere in which the mental impressions and exercises are little more varied than those of a horse in a mill—will individually have an effect upon the character of the mind, and will concur with previous relations of growth to disguise its resemblance to the original from whence it proceeded.

365. From these and various other considerations, it may be inferred that the embryo derives its vital properties from both parents, those of either parent somewhat predominating in certain cases, and as respects certain properties; that these properties vary in grade in different classes of animals, the highest of which furnish incontestable proofs of the possession of several of those faculties which we attribute to mind; and that the same grade of vital properties is communicated to the embryo as characterize the parents—these properties developing in the embryo the material fabrics or structural arrangements about to become the instruments or media of their manifestation; mind, and especially the powers of association and reflection, being the highest grades of these properties, and requiring a more complete development of the brain for their display.

366. *C.* If, then, the conclusion that the mind is not a mere result of structural arrangement, is deducible from satisfactory evidence, it remains to inquire still farther *for the relation subsisting between the mind and the material fabric with which it is associated.* A perfect account of this relation is most probably beyond the reach of our faculties; but, among various other topics, it comprises much of what has already been alluded to, as well as a statement—1st. Of the circumstances upon which the existence of a mind or intellectual principle depends; 2dly. Of the mode of its connexion with the material fabric; and, 3dly. Of the mode by which changes or conditions of the mind, and of the organization, affect each other: but to these topics I can only briefly and imperfectly allude.

367. *a.* Most of the circumstances upon which the existence of mind depends have been noticed, as far as they are known to us. It has been shown above that the powers of mind are the highest properties of life evinced through the medium of a perfect nervous system; that these powers, with the other properties of life, are derived from parents; that they are developed during the early stages of existence; that they become known to us only through the instrumentality or medium of a cerebro-spinal nervous system, actuated by the vital endowment of the frame; that the phenomena of mind are produced chiefly by relations subsisting between it and external objects—by sensations transmitted to the brain and there disposed of, according to their relations with the other properties or powers constituting the intellectual principle or mind, and partly, also, by its powers of suggestion, abstraction, comparison, and reflection; and that the connexion of mind with its material fabric is one of alliance, and not of necessary dependance, or of dependance only as far as the structure may be required as a medium between the mind and external objects, or may concur to its support or phenomena.

368. *b.* The *bond* or *connexion* subsisting between mind and organization can be viewed only as one of affinity or *alliance;* and the sole reason we can assign for this connexion is, that it is a law of nature. We have seen that this alliance is of such a kind as that the *existence* of mind is not necessarily dependant upon the material fabric, but that we are rather entitled to consider the organization to be dependant upon life, mind being those manifestations of life evinced by the cerebro-spinal nervous structures, and resulting from the vital endowment actuating these structures; for it is impossible to conceive that an organized body could have come into existence without a vital or animating principle; and it is equally impossible to conceive how an animating principle, and more especially its higher properties, or powers—the faculties of mind—could have been manifested or duly exerted, unless in most intimate alliance with matter, the molecules of which it could so build up and actuate as to render them the media and instruments of communication with the other materials constituting the visible world. When, however, the molecules of matter are thus built up, variously formed and actuated, they are incapable of perpetuation, in their numerous and wonderful states, or even of more than a momentary existence, unless in alliance with and endowed by life—by that life which organized the molecules of matter, developing and perfecting them in their respective forms and grades of being. As soon as the alliance of life and organization is divorced, the former escapes the cognizance of our senses, our unaided reason being incapable of acquainting us with its subsequent states of alliance or existence, and the latter returns to its elementary states. Thus we per-

ceive that organization, with all its phenomena, is dependant upon life from its commencement to its termination—its commencement resulting from the vital endowment bestowed at first by parents, and perpetuated afterward by assimilation; its termination, ultimately, being consequent upon the loss or departure of this endowment, without which it can no longer exist. But while organization, with all its functions, is the result of, and is necessarily dependant upon a vital endowment, in all its grades and manifestations, this endowment is not necessarily dependant upon organization, although associated with it in such a manner as fully and duly to actuate it; and this latter conclusion is supported by the reasons assigned above (§ 356), as well as by the consideration that life, in all its grades, may exist independently of the material fabric which it actuates, although placed beyond the spheres of our senses. This is not above the range of conception or of probable existence, but admits of belief equally with other remote causes of visible phenomena; whereas the dependance of life and of its highest manifestation, or mind, upon organization is incompatible with our experience of the numerous objects composing the external world, with our conceptions of possible phenomena, and with their causation, perpetuation, and termination.

369. *c.* The *mode* in which changes of the mind and of the organization affect each other can be only obscurely or imperfectly recognised; but, still, enough is manifested to show, 1st. That changes in the manifestation of the mind affect the organization by primarily disturbing the functions of life in organs intimately related to the nervous system; and, 2dly. That changes in the organization affect the mind, in consequence either of the molecular arrangement of the material fabric, necessary to the healthy state of mind, being disturbed, or of the affinity or alliance existing between this fabric and its vital endowment being weakened or deranged, or of disorder of this endowment occasioned by the changes of its associated material fabric, these changes deranging the manifestations of life usually evinced by the brain. Each of these propositions requires farther remarks.

370. 1st. In illustration of the influence of the mind upon the organization, it may be stated that the depressing passions impair the functions of digestion, and weaken the action of the heart; and, if these effects are intense or prolonged, the organization not only of the digestive and circulating viscera, but also of the brain, becomes affected through the medium of the nervous and circulating system. Here we perceive that changes in the functions of an organ affect both that organ itself, and also other organs related to it, by means of nervous and vascular connexions.

371. 2d. If the structure of the brain be changed, the consequences are not uniform either as to extent or character: there may result disorder, 1st, of the mind; or, 2dly, of connected or related functions; or, 3dly, of both mind and related functions. Yet these consequences are not necessary or absolute, they are merely contingent; they are not constant or uniform, but uncertain and frequent: for numerous facts prove that the fabric of the brain may be most palpably and variously changed without the mind being appreciably disordered, and that the most severe mental disturbance may suddenly occur, and as suddenly disappear where no lesion of the organization of the brain can be detected, or even inferred. These facts lead to the conclusions, 1st. That changes in the mind, or vital manifestations of the brain, do not result uniformly, or even generally, from a disturbance of the molecular arrangement of this organ; and, 2dly. That changes in the mind depend either upon impairment or other derangement of the affinity or alliance subsisting between the fabric of this organ and its vital endowment, or upon alterations in the state of this endowment, whether occasioned by lesions of its associated structures, or occurring independently of such lesions. To either or both of these alterations disordered states of mind may be imputed; and either of them will explain the fact that these states of disorder proceed in some cases from alterations of structure, and in others without any appreciable alteration. They both, especially the latter, explain those sympathetic states of mental disorder which are of so frequent occurrence. Thus, the organization, or even the function of a remote organ, is seriously disturbed, and the vital manifestations of the brain, or the mental powers, suddenly become more or less disordered, and as suddenly are restored to their healthy state. There is, however, no reason to conclude that the material fabric of the brain is altered in such cases. All that we are entitled to infer is, that the change in the primarily affected organ has so disturbed the vital endowment of the frame as to disorder in a special manner the manifestations of this endowment in the brain and nervous system; or, in other words, so as to derange the states of mind, or the various conditions of conscious sensibility, in relation to its internal and external causes. From the preceding observations, and from numerous facts and considerations which my limits would not admit of being adduced, I may state the following inferences, as possessing more or less of practical importance, especially with reference to mental disorders, although their practical bearings may not be very obvious to the empirical or routine practitioner.

372. (1.) An organized being did not organize itself; the creature did not create itself, but was created; and all we know with precision, especially in respect of the origin of the more perfect animals, is, that they have proceeded from parents or anterior living existences.

373. (2.) Our present knowledge warrants the conclusion that the derivation of organized bodies from parents depends upon certain material elements which proceed from both parents, and which are endowed, or associated with a vital emanation from their parents, the combination or mutual influence of these elements and of their vital endowment producing the new animal; and that the material elements furnished by the parents towards the production of their offspring, and vitally endowed by them, are of such a nature as to admit of conversion, under the influence of life, into those tissues more immediately required in the early stages of development, and of separate existence of the offspring.

374. (3.) Every consideration of the subject confirms this inference—that not only does a

vital emanation proceed from each of the parents, in connexion with the material elements furnished by them towards the formation of the new animal; but also that this emanation, or vital endowment, is possessed of properties, although in a latent or non-manifested state, similar to those possessed by the parent which furnished it; and that the vital emanations or endowments proceeding from parental sources combine in producing the new animal, and form and develop the material elements with which they are allied or associated.

375. (4.) There is every reason to infer that the embryo derived from these sources requires to be furnished, for a time, with those elements of assimilation necessary to its development, and to its future state of independent existence; and that such assimilation and development are accomplished by means of the vital endowments derived by both parents, although re-enforced or promoted, or, at least, favoured by the circumstances in which the embryo is placed in respect of one of its parents.

376. (5.) The animal, being thus organized by means of vital endowments derived from these sources, is afterward supported by these endowments; the offices performed by each and every part of its frame, whether tending to the continuance of its existence, to the perpetuation of its species, or to communication with objects external to and remote from it, depending upon these endowments being weakened as they become impaired, or disordered as they are disordered, and ultimately ceasing immediately when they disappear or depart from the body which they thus preserved and actuated.

377. (6.) An organized body thus vitally endowed presents an assemblage of organs, each of which performs, while actuated by life, certain offices or functions; their tendency or purposes being, 1st, to continue the existence of the animal, by assimilation of the elements of matter external to itself; 2dly, to perpetuate the species; and, 3dly, to hold relations, more or less extensive, with the physical, and, in man, also with the moral or social world. These organs or viscera are respectively endowed with life, which is either intimately associated with a general system or tissue, supplying all organs and parts of the frame, or is more generally diffused to all the structures, and even partially also to the circulating fluids; and they manifest this endowment in various modes, according to their organization; their offices or functions being performed under the influence of life, and only by means of its influence, but through the instrumentality of the organization. The functions of a living animal being thus altogether or entirely dependant upon life, these functions may be viewed as the manifestations or properties of life through the intervention or medium of the structures. Thus, irritability is a manifestation or property of life by means of the muscular system, and the various modes of sensibility are manifestations or properties of it evinced by a cerebro-spinal nervous system.

378. (7.) Conscious sensibility, in all its forms, and the intellectual and moral states, in all their varieties, arising from the relations of consciousness with its numerous external and internal occasions, are the highest properties or manifestations of life through the instrumentality of the brain; perfected, however, or called into existence or activity, by sensation, education, and reflection. These manifestations of vital endowment by means of a perfect nervous system are the properties, powers, or faculties of mind, which are known to us only in alliance with this system.

379. (8.) The powers of mind being, then, the highest properties and manifestations of life, through the medium of a perfect nervous system, are dependant upon the vital endowment of the frame, or result from this endowment while actuating its allied material fabric; the states of conscious sensibility, or of the mental principle, depending as much upon it as upon changes in the organization of the brain itself. The faculties of mind are, therefore, manifestations of the vital endowment, through the instrumentality and medium of the encephalon: this endowment, in actuating this particular part of the fabric of the body, evincing these faculties or mental phenomena. In this process, it is obvious that the particular conditions of the general vitality, whether as to power, or character, or quality, must influence the results or the manifestations of mind, independently of any change of an obvious or appreciable nature in the fabric of the brain; and that disorders of mental manifestation will proceed as much from the conditions of the general vital endowment as from alterations of the structure of the organ.

380. (9.) It having been shown above that the vitality of the frame, as it endows and actuates the brain, is not necessarily dependant upon, but is merely allied or associated with the brain, it follows that changes of the structure of this organ may or may not affect the mental powers, so long as they are not of such a nature as to seriously disorder the vitality of the frame; and that, when the mental faculties are deranged in consequence of alterations in the fabric of the brain, the disorder is owing to the disturbance which such alterations produce in either the general or the local vital endowment, or both; the local lesion affecting either the general vitality, or that part of it endowing the encephalon more particularly, or both, contingently and frequently, but not necessarily or uniformly.

381. (10.) The alliance of the vital endowment with the material fabric being intimate, it may be inferred that affections of the one will disorder and ultimately change the other, when intense or prolonged; although, in persons possessed of robust frames and much vital energy, the disorder of either may be severe, without its associate being seriously changed. Intense affections of mind hence may or may not change the allied fabric, and *vice versâ*, according to the susceptibility of the system, and various other concurrent circumstances. This being the case, much of the structural lesion observed in old cases of mental disease is as probably the result as the cause of such disease; the prolonged disorder of the vital endowment of the brain ultimately modifying the organization of that structure or fabric which was the instrument or medium of the disordered manifestation. In such cases the mental affection will influence the general as well as the local vital endowment, although it is primarily merely a disordered state of that endowment, either generally or locally, and react upon it to such an extent as

ultimately to change the allied fabric either of the brain or of remote organs.

382. (11.) As the powers of mind are manifested only through the medium of the encephalon, and are not the products of its organization—as they are the higher properties or manifestations of life only in alliance with, and through the instrumentality of this organ—and as affections of the vital endowment, or disorders of these manifestations, and changes of the intimate fabric of the encephalon, only contingently and frequently, but not necessarily or generally, disorder each other—so it follows, that the amount of the disorder evinced by the mental power is no index to the extent or nature of the change existing in the brain, nor even a proof of the existence of any such change; and farther, that the extent of change in the encephalon produces no correlative disorder of the mental powers; and that most extensive lesion may be present in the former without the latter being materially, or even at all, disordered.

383. (12.) Although lesions of the brain are often evinced by disorder of the mental powers, they are more generally and certainly indicated by the physical disorder, or by phenomena displayed by distant but related parts. When lesions of the brain exist in connexion with disorders of the mind, these lesions, in respect both of their nature and extent, are indicated rather by the physical than by the mental phenomena; the states of the general vital power, or endowment, being kept in view.

384. (13.) Disorder of the vital manifestations of the brain being as dependant upon the states of the general and local vital endowment as upon alterations of the fabric of the encephalon, or even more so, it follows that the states of this endowment, generally and locally, and in connexion with changes of structure in various or remote, but related parts, should form the bases of our pathology of mental disorders, as much as lesions of the fabric of the encephalon; and ought, moreover, to be the grounds and guides, as much as they, of our therapeutical indications, and the guides of our intentions and means of cure, whether hygeienic, moral, or strictly medical.*

385. VIII. TREATMENT OF INSANITY.—There are few maladies which are more successfully treated than insanity, when the means of cure are promptly employed, and appropriately to the varying forms and features of individual cases; and there is none which requires, in order that all possible success should be obtained, a more comprehensive knowledge of morbid actions, of the disorders, not only of the brain, but also of the other viscera, and of the intellectual and moral manifestations, as variously modified, influenced, or disordered, by the predominant feelings, the manners, the prejudices, the dissipations, and the vices of society. In attempting to give a full exposition of the treatment of mental disorders, as far as the existing state of our knowledge will enable me, it will be necessary, *first*, to offer some observations generally applicable to the treatment of insanity; *secondly*, to state the means which seem most appropriate to the different forms of the malady; *thirdly*, to estimate the value of the principal remedies in the several states of derangement; and, *fourthly*, to consider the moral management of the insane.

386. i. REMARKS MORE GENERALLY APPLICABLE IN THE TREATMENT OF INSANITY.—It was formerly too much the practice to treat the insane according to a certain routine or system, without reference either to the causes, or to the form of the malady; and the routine or system followed was generally based upon some prevalent doctrine applied to it, or some generally adopted system of pathology. Thus, the ancients had recourse to drastic purga-

* [If the "mind is the result of the vital endowment of the brain," as contended for by our author, it is difficult to understand how "the mind is independent of the material fabric with which it is associated," a doctrine which, if we mistake not, is advocated in the preceding sections. The views and arguments of Mr. COPLAND, on the nature of mind and the mode of its connexion with matter, appear to us less clear and satisfactory than those advanced on most other subjects; and we apprehend it would not be difficult to find a satisfactory answer to the questions he raises and the difficulties which he suggests. Mr. C. has already admitted that the brain "is the seat of mind" (§ 342); how, then, can it be said that the "doctrine of organism has been found fallacious and untenable!" (§ 361.) Phrenology not only claims that the brain, in our present state of being, is the instrument with which the mind acts; that material organs are necessary for the mental manifestations, just as eyes and ears are necessary for sight and hearing, or a stomach for digestion, but it even goes farther than this, and contends that the opposite doctrine, viz., that the mind acts independently of organization in this life, militates against the immortality of the soul, making it a changeable essence, and subject to infinite alterations; weak and fickle in infancy, strong in manhood, imbecile in old age, and liable at all times to be afflicted with idiocy and madness. The truth is, that the theory of Mr. COPLAND only removes the difficulty a step farther back; it substitutes another link in the chain—*vital endowment*—which is also presupposed by those whose views he strenuously opposes. The phrenological school by no means support the doctrine that the *existence* of mind is necessarily dependant on the material fabric, but believe that it is a principle superadded to matter, on which, however, it depends entirely for its manifestations in our present state of being. If this is not proved by everything that we know of mind and body, in health and disease, then it would be difficult, we imagine, to find any physiological truth demonstrated connected with the human organism. So far as liability to the charge of *materialism* is concerned, we consider the theory of our author quite as objectionable as that of the phrenologists, for he supposes the mind owes its manifestations to the *influence of the nervous system*; whether the bond or connexion be one of affinity, or whether it be explained in some other manner, matters not. We call attention to this point, because we conceive that it lies at the very foundation of the true pathology and treatment of the various forms of insanity. We believe it necessary to place derangements of the internal faculties in the same relation to the organic affection producing them, in which physiology places the derangements of the external senses. As sight and hearing are not impaired without disease of the organs on which these functions depend, so there is every reason to believe that thought and feeling are never deranged unless the cerebral organs, by which they are manifested, have undergone some morbid change. These views lead us to regard derangement of the mind, not as a specific disease, but a symptom attending many different affections, having the brain for their seat; neither does this doctrine, sustained as it is by observation, experience, and pathological investigations, confound mind and matter, nor militate against a belief in the soul's immortality; it leaves this great doctrine to be decided by Divine revelation, on which, after all, it must ultimately rest. We do not deem it necessary to go into an examination *seriatim* of the conclusions to which our author has arrived in relation to this subject; on one point, however, we may remark briefly. Mr. C. admits that the "brain is the organ, instrument, or medium of communication between the mind and the external world" (§ 360), and he supposes that "changes in the organization affect the mind in consequence of the molecular arrangement of the material fabric necessary to the healthy state of mind being disturbed," &c. But, in § 382, he states that "most extensive lesion may be present in the brain without the mind being materially, or even at all, disordered." This statement, so far as we know, can hardly be sustained in the present state of our knowledge in cerebral pathology; it, moreover, clashes with previous admissions, and, if admitted, would go to sustain a belief of the entire independence of mind on matter in our present state, a doctrine which is rejected by our author.]

tives, and especially to hellebore; the discovery of the circulation of the blood led to the employment of sanguineous depletions; and the general adoption of the humoral pathology, at a still more recent period, was followed by a revival of the use of purgatives in this class of disorders. It must be obvious, however, to all who have observed the very different forms, the varying phases, and the numerous complications of these disorders—who have viewed them in connexion with their causes, and with their effects upon the organization—that they, of all maladies, require not only the most diversified, but also the most opposite means, according to the different *causes* and *kinds* of disorder, and to the changes observed in particular cases.

387. Each case of mental disorder presents certain circumstances, all which require calm consideration, in order that it may be successfully treated. 1st. *The causes*, whether moral or physical, predisposing or exciting, should be viewed, in respect of their individual and combined operation—of their action on the system generally, and on the brain, or any other organ, particularly—and whether acting primarily and immediately, or secondarily and sympathetically. 2d. *The state* and *stage of morbid action* ought to be ascertained, as regards both the grade of action, generally and locally, and the influence which such action seems to exert upon the manifestations of mind; and, 3d. *The condition of the organic functions*, not only as it may be the cause of general and local morbid action, but also as it may be the consequence of such action. On these circumstances are based those indications of cure which should be proposed when entering upon the treatment of every case of mental disorder. 1st. *The causes should be removed in ways appropriate to their nature and combinations.* 2d. *General or local morbid action ought to be moderated, controlled, or removed, according to its nature, whether it be increased, or excited, or imperfect, or deficient.* 3d. *The several organic functions should be promoted, when impaired; and restrained, when inordinately excited, either individually or collectively.* It is unnecessary to state here how these intentions are to be severally carried into effect. The method or plan of procedure must necessarily vary with the circumstances characterizing the different forms of the malady, and the individual cases of these forms; but the remarks which I have to make may be referred to each of these indications, and in their respective order.

388. *A. The seclusion of the insane* is a question of the first and greatest importance, not merely as respects the removal of the causes of disorder, although this is one of the chief points in which it should be viewed, but also as regards the physical and moral treatment. That every person who is more or less disordered in mind should be separated from those with whom he has been accustomed to live, and from his family and friends, and restrained from his accustomed habits and manners, and confided to the care of strangers, in a place altogether new to him, may not be affirmed universally; but the exceptions to this rule are not numerous, and should be made, in practice, with care and discrimination. As to the propriety of this measure, the most experienced physicians in Great Britain and in foreign countries are agreed. M. ESQUIROL remarks, that recoveries are comparatively more numerous among the patients who come to Paris to be treated than among those who inhabit that capital, for the latter are less completely isolated than the former.

389. *a.* The first effect of this measure is to produce new sensations, to change or to break the series of morbid ideas of which an insane person cannot divest himself: unexpected impressions are made upon him, arrest and excite his attention, and render him more accessible to counsels which may restore his reason. Generally, as soon as he is thus secluded, he is surprised and disconcerted, and experiences a remission of the disorder, that is of the utmost consequence in the treatment of it, and in acquiring his confidence. The change is not the less useful, observes M. ESQUIROL, in combating the disorder of the moral affections of the insane. The disturbance of the nervous system renders the sensations morbid, and often painful; their natural relations with the external world are no longer the same as in health; all things seem disordered or overturned. The patient cannot believe that the cause of these phenomena is in himself. He is persuaded that every one wishes to contradict and irritate him, because they disapprove of his excesses: not understanding what is said, he becomes impatient, and puts an unfavourable construction on what is addressed to him. The most tender expressions are taken as offences, or for enigmas that he cannot comprehend. The most assiduous care is vexatious to him. The insane patient, having become timid or sullen, suspects every one who approaches him, and especially those who are dearest to him. The conviction that every one is inclined to torment, defame, and to ruin him, increases the moral disorder. With this symptomatic suspicion of those about him—which generally increases, without any motive or cause, from inevitable circumstances or opposition, and with the change in the intellects—to allow the patient to remain in the bosom of his family might soon be followed by the most disastrous consequences, not only to himself, but also to others.

390. Where the husband suspects the cares and assiduities of the wife, or the wife those of the husband, and supposes that he or she is in league with those who conspire against him; where the lunatic believes that the members of his family are the slaves destined to obey his sovereign commands, or are the ministers or apostles of his mission; where the cause of the mental disorder exists in the patient's own family, or arises from dissensions, chagrins, reverses of fortune, or privations; where the insane person entertains an aversion, hatred, or dislike to any member of his domestic circle, and particularly to any one who had been most dear to him; or where the parent, or the son, the lover, or the friend, is impressed with the sentiment of his incapability of fulfilling the duties which he conceives to be imposed upon him, the necessity and advantages of removal, and complete separation from the object of his aversion, of his anxieties, or of his fears, are especially obvious and indisputable. The dislike entertained by the insane to those who had

once been most dear to them, without either cause or motive, imperatively demands the removal of the patient, who generally readily becomes calm before, or attaches himself to, an agreeable stranger, owing either to the circumstance of his presence being unattended by any unpleasant association or suggestion, or to a feeling of self-love which induces him to conceal his sentiments and his state, or to the novelty of the impressions produced by strange persons and objects. While these are the chief inconveniences and difficulties in the way of the treatment of the insane while they remain in the bosom of their families, there are great advantages to be derived from removal to a place suitable to the management of this class of patients.

391. *b.* But how should the seclusion or the separation of the insane be carried into effect? That it should be effected by means of an asylum or institution devoted to their treatment, in the great majority of cases, is generally admitted; although removal to such a place may be unnecessary in some instances, or unadvisable in others, owing either to the character of the disorder, or to the peculiar position of the patient—to the circumstances connected with certain cases. *Partial seclusion* or separation may be resorted to in some cases, and especially in those which are slight. A partial separation is when the patient remains in his own house, and is separated either partially or altogether from the members of his family and his friends, and is placed in the care of one or more suitable persons. Seclusion is more complete when he is sent to travel, or to make a voyage, in the custody of proper persons, or of one or more of his relations or connexions. And it is *complete* when he is removed to a residence altogether new to him, and surrounded by strangers, to whose care he is committed. Of this last kind of separation there are several modifications, the chief of which are: 1st. A private residence, devoted to the patient and to those placed in charge of him; 2d. A private asylum, containing several or many inmates; and, 3d. A public or large institution, destined to the reception of a great number. In the great majority of cases, the seclusion, in order that it may be fully successful, should be complete; and the last of these modes, when provided with all the appliances and advantages which many of these now possess, is the most useful, as it conjoins, with complete separation from the relations of the insane, several arrangements and circumstances obviously beneficial. M. Esquirol remarks, that the patient should be removed to an institution devoted to the treatment of mental disorders, rather than to a private asylum or residence. Partial isolation is much less successful than that more completely afforded in a well-regulated institution. The chief objection which has been urged against the latter is the association with a number of companions in misfortune; but this is not injurious, is no obstacle to recovery, but is even of service, inasmuch as it causes the patient to reflect upon his condition; and, as the objects around cease to impress him, he is amused or distracted by those about him, is occupied by the objects passing around him, and thereby abstracted from what is apt injuriously to engage his thoughts. Large institutions, moreover, present greater facilities for the protection of the maniacal and furious, without having recourse to injurious or irritating means of coercion and restraint, and the attendants are more experienced in their management than in a private house of detention. The advantages, however, of treatment in institutions of this kind depend entirely upon the medical acquirements and the characters of those intrusted with their management; upon the nature and completeness of the arrangements, therapeutical, hygeienic, and moral; and upon the organization and discipline of the whole establishment. Still, there are cases to which removal to institutions or asylums for the insane is not applicable, however ably they may be managed, and their inmates treated; and, to these cases especially, removal thence might be productive of injury, particularly if the seclusion were not modified according to the susceptibility of the patient, to the character of the disorder, and conformably with the passions, the habits, the feelings, and the modes of living and manners of those subjected to it. It is not to be considered as a measure which should be universally employed. In this, as in all other departments of medical practice, experience—that is, close observation of phenomena, a knowledge of all matters related to individual cases, and a comprehensive view, and weighing of circumstances—will generally decide correctly as to its propriety.

392. Example, which has so great power over the opinions and actions of man, also influences the insane, who are often not deficient in sagacity and in the power of comprehending what is passing around them. The recovery or the departure of a patient creates confidence in others, and a hope of recovery and restoration to liberty. The convalescents, by their conduct and advice, console and encourage those who suffer, and thus are of the greatest benefit; one class of inmates of such institutions acting beneficially on the other, and favouring the success of the treatment. The calm, also, enjoyed by all; the moral repose arising out of removal from the habits, the business, the perplexing cares, the domestic anxieties and chagrins, and the irritating contrarieties to which they were previously exposed; the regular mode of living, the judicious discipline, and the regimen to which they are subjected, and the necessity of duly comporting themselves—of conducting themselves with propriety before strangers and before one another—all tend to suggest rational reflections, and become powerful auxiliary means of recovery. The cares and attentions which the insane receive in their own families are counted as nothing; but the attentions paid them abroad, or by strangers, are appreciated, because they are novel, and are neither due nor exacted. Hence the control readily obtained by those to whose care they are committed, when they are kindly and judiciously treated.

393. *c.* For melancholic and various forms of partial or slight insanity, complete separation is sometimes unnecessary, or even injurious. Partial separation, travelling, and various modes of exerting moral control, according to the peculiarities of the case, are often best suited to these states of disorder. Mania, and several states of monomania, demand complete seclusion. Demency, imbecility, and idiotcy require

more or less complete separation—at least from society. Complete seclusion is generally necessary to the poor lunatic, as he would otherwise be unprovided with the aid required to restore him to his family.

394. *d.* Separation and isolation act directly on the brain, composing it to tranquillity, shutting out irritating impressions, repressing excitement, and moderating the exaltation of the passions and ideas. The sensations of the maniac are thereby reduced in number and intensity; and his attention arrested, and even fixed, by thus being reduced, by the novelty of those which are excited, and by their frequent repetition. The melancholic and monomaniac are torn away by it from their morbidly concentrated thoughts and ideas, and are directed to different objects or topics—especially when proper means of distraction are had recourse to—when judicious moral management is conjoined with enlightened medical treatment.

395. *e.* In separating the insane from their families, the place of residence selected for them should be healthy, airy, and protected from cold winds, as well as from humidity and offensive exhalations. Their constitutions are generally more or less impaired and enfeebled, and they are consequently the more obnoxious to depressing influences and contaminating agents. They are generally predisposed to cutaneous eruptions, enlargements of the glands, and general cachexia; and they therefore require the more a dry and temperate, or even moderately warm air. It is a grievous mistake to suppose that they are insensible to cold and atmospheric vicissitudes. Although they may not give expression to their sensations, their constitutions, and even the states of their minds, are remarkably affected by cold, humidity, and sudden changes of weather and season, against which they should be completely protected.

396. *f.* The period at which the seclusion of the insane should terminate is not easily determined. Experience of a diversity of cases and circumstances is the chief guide to a just conclusion. When this measure is found to be unavailing, after having been duly employed, the visits of near relations, friends, or former connexions, may be tried, great discretion being used in the selection of those who are the first to be admitted to the patient. In such cases, the visit ought to be sudden and unexpected by him, in order that it may make the stronger impression. The utmost care should be taken in the admission of the visits of friends to convalescents; and, with them, suddenness and surprise should be guarded against. Upon the whole, it is preferable that seclusion should be prolonged, rather than that it should cease prematurely. This measure, moreover, ought not to be had recourse to in any state of delirium consequent upon, or symptomatic of febrile diseases, and seldom in puerperal insanity.

397. *B.* To establish *the medical treatment* upon a sure basis, it is necessary to obtain as complete a knowledge as possible of the predisposing and exciting causes of the malady; to ascertain the physical as well as the moral sources and relations of it; to determine whether the physical occasions the moral, or the moral causes the physical derangement; and to recognise the cases which will recover spontaneously upon separation or isolation, and upon the removal of the causes; those which require chiefly judicious moral management; those which demand medical treatment; and those for which a combination of these means will be requisite. Regardless of these and various other important considerations, the medical treatment of the insane has too generally been conducted either empirically, or in the spirit of a narrow and exclusive system. Influenced by theory, or a predominant doctrine, some have referred mental disorders to inflammation, and have abused the various modes of blood-letting; others have believed that these disorders proceed from a morbid state of the biliary and digestive functions, and have disordered still more these functions and their respective organs by emetics and drastic purgatives; and many have considered the nervous influence solely in fault, and have attempted to correct it by means of antispasmodics and stimulants; hence the treatment has been nearly as often prejudicial as beneficial; and recovery has taken place in many instances, *notwithstanding* the means that have been used, rather than *by the aid* of them.

398. *a.* When called to a case of insanity, the obvious duty of the physician is to ascertain the predisposing and exciting causes; the several circumstances co-operating with these causes, or contributing to their influence and intensity; the particular form or character of the disorder, its duration, and physical relations; the states of the several functions, organic and cerebro-spinal, and the connexion that may exist between the mental disorder and the states of these functions, or of their respective organs. He will, moreover, observe whatever may exist of a pressing nature, or whatever indication there may be urgently requiring to be fulfilled; as, for example, whether or not the signs of vascular determination to, or excitement in the brain be obvious, and indicate impending risk to the organ; whether there be general vascular plethora or vascular inanition; whether some accustomed discharge, evacuation, or eruption has been suppressed; and whether or not the patient has been subject to some constitutional disorder, as gout or rheumatism. It is manifest that these are matters most necessary to be known upon commencing the medical treatment of every case of mental disorder; and, without they are assiduously investigated, in no one instance can such disorder be appropriately treated. Where these more urgent indications exist, they require instant attention; where the blood is strongly determined to the brain, the usual means of subduing the morbid action—local depletions, the cold affusion, or tepid douche, or shower bath, external and internal revulsants and derivations, suitable diet and regimen, &c., are requisite; where the vascular system is plethoric or inordinately excited, sanguineous depletions, refrigerants, sedatives, evacuations from the bowels, the skin, and urinary organs, and low diet are necessary; where the catamenial or the hæmorrhoidal discharges, and eruptions or evacuations, either sanguineous or serous, or of other characters, have been suppressed, or have ceased to appear after the accustomed interval, the most active means must be prescribed, in order to reproduce them, or as substitutes for them.

399. *b.* Having removed the cause and concurring circumstances of the malady—having thus fulfilled the more urgent and pressing indications, and having remedied such morbid conditions of the organic functions as may have existed, the more acute symptoms or stage of the malady will subside in about 8, 14, 21, or 28 days, or generally within 40 days, and a remission, or even an intermission, will occur. At this period, judicious and appropriate moral means should be brought in aid of the physical treatment, while the causes, moral, hygeienic, and pathological, ought to be removed or combated. If the recovery does not proceed satisfactorily, or if these means, varied according to the particular circumstances of the case, do not produce beneficial results, other remedies, sanctioned by experience, must be tried. These, however, will be fully noticed in the sequel.

400. *C.* As the malady thus lapses into a more or less *chronic form*, local or general manifestations of morbid action, which occasionally appear, return, or even remain, should be removed or suppressed by the usual and generally obvious means; and signs of disordered sensibility should be traced to their sources, and their pathological causes removed. Whenever disorder or disease of any organ in the abdominal or thoracic cavity is evinced, the fact of such disorder being frequently connected, either as cause or effect, with that state of the brain which occasions the disorder of its associated mind, should be kept in recollection; and an appropriate treatment ought to be directed to the quarter thus manifesting disordered sensibility or function, always bearing in mind that morbid action in the substance of the brain is more frequently indicated by morbid sensations and disordered movements and functions in remote than in adjoining parts.

401. During the whole course of the treatment, the several organic and reproductive functions require attention. The state of the digestive organs, and especially of the biliary and the intestinal secretions, and, indeed, the whole of the excretory functions—the fæcal, the urinary, and the cutaneous—ought to be duly, or even daily observed, and promoted whenever scanty or suppressed, or restrained when they become so excessive as to debilitate. More frequently, especially at the earlier periods of the malady, these functions require to be promoted; and as the defect, as well as the disorder of these functions, is often owing to impairment of the organic nervous or vital energies, the restoration of their healthy states should be attempted chiefly by means which will also invigorate these energies. With this intention, stomachics, tonics, or restoratives should be conjoined or alternated with purgatives, chologogues, or alteratives; and the bowels ought never be allowed to be confined, or the biliary secretion to be deficient. The appearances and sediments of the urine should be ascertained, and alkalies or acids administered accordingly, with gentle stomachics and diuretics; and the action of the skin ought to be duly regulated by the cold, the shower, the tepid, or the warm bath, and by frictions and clothing, according to the form or stage of the malady, and the particular conditions of the cutaneous function. The states of the reproductive organs also require observation, especially of the uterus. And it should not be overlooked, that these organs are often abused by solitary indulgence, in such a manner as both to cause and to perpetuate the malady. Where this is detected, or even suspected, means should be contrived to prevent it. In advanced stages of insanity, although the treatment should be conducted, with reference to the removal of existing pathological states and of disordered mental manifestations, according to rational principles; still, when means thus devised fail of success, other and more empirical remedies, sanctioned by experience, ought not to be neglected. To these, however, sufficient reference will be made hereafter.

402. *D. The clothing* of insane persons, particularly of the melancholic, should be warm. In general, flannel may be worn next the surface; and dry friction every morning will be useful. The patient should sleep on a hair mattress and hair pillow. His head ought to be somewhat elevated, and generally uncovered. The insane epileptic ought to sleep in a very low bed, to prevent accidents during a paroxysm. The propriety of devoting strict attention to cleanliness, in respect both of his person and clothes, is obvious.

403. *E. The food and diet* of the insane must necessarily be varied with the nature, complications, and stage of the disorder, and with the circumstances of particular cases. In the more acute attacks or stages of the malady, the diet and regimen ought generally to be antiphlogistic; at a later period, and in more chronic cases, and particularly in states evincing vital depression or exhaustion, the food should be more nutritious, in larger quantity, and easy of digestion; but hot spices and stimulants ought not to be allowed. During convalescence, the diet may be more substantial, but not heating, and duly regulated according to the exercise that is taken. The meals should be at regular periods, and deliberately partaken of, and well masticated. A sufficient quantity of fluids should be allowed to assuage the thirst of the patient, which is generally urgent in mania, and in some cases of monomania; but they ought not to be given, unless when necessary, or when, in certain cases, a profuse use of them forms a part of the treatment.

404. *F. The management of convalescence* is one of the most difficult parts of the treatment of the insane. If the patient be not placed in favourable circumstances for some time after the subsidence of the malady; if he be not carefully and kindly watched; if contrarieties of mind, family dissensions, and all the remote causes, moral and physical, be not sedulously avoided; and if the diet, regimen, and mode of living be not suited to his constitution and the peculiarities of his late disorder, the risk of a relapse will be great. At this period, and for long afterward, much mental exertion or application, sudden bursts of passion, and excesses of every description must be shunned; and the earliest manifestation of physical disorder—of headache, of disorder of the digestive organs, and of interruption of accustomed evacuations or discharges—should be met with local depletions, purgatives, revulsants, diaphoretics, and other means appropriate to the nature of the disorder. As convalescence proceeds, change

of air and of scene, and travelling with a suitable companion, or one capable of amusing, fortifying, and even of controlling the mind, will be most beneficial; and such mineral waters as will promote the secretions and excretions, and, at the same time, strengthen the constitution, without exciting or heating the circulation, or determining the blood to the head, will often prove of essential service.

405. *G. The measures proper to prevent insanity, and more especially a relapse or return of it,* are most obviously presented to the reader in the full exposition I have given of the predisposing and exciting causes. The avoiding of these constitutes the chief, and, indeed, the only *prophylaxis*. Young persons whose parents have been the subjects of this malady should have especial attention paid to both their physical and their mental development; and while the former is promoted by exercise in the open air and healthy occupation, the latter should be cultivated without being over-exerted, and sound religious and moral principles ought to be inculcated, care being taken to avoid indulgence of the caprices, passions, and selfish feelings. The instruction of these persons should not be premature; but the desires and passions ought to be early restrained. The judgment should also be early and judiciously informed, without fatiguing the mind; and the control of parents or guardians ought to be prolonged for a considerable period after puberty, and until the mind, conduct, and constitution are fully formed.

406. ii. Of the Treatment of the Specific Forms of Insanity.—*A.* Partial Insanity.—*The simpler forms* or *slighter grades of insanity* severally require a moral management, as well as a medical treatment, appropriately directed to their different states and characters, which, however, are so diversified as to preclude the possibility of my considering the subject with reference to any but those which are the more common and prominent.—*a. In the various states of moral insanity* (§ 69, *et seq.*) in which the patient is not labouring under any illusion, or erroneous conviction, or disorder of the understanding, the propriety of *seclusion* cannot be decided upon, excepting with reference to the features of, and the circumstances connected with individual cases. Many of these states of moral disorder, consisting chiefly of errors in action and conduct, are not of that grave and well-marked kind which is considered, in the eye of the law, to require the privation of liberty, although, in the majority of such instances, the conduct of the patient may be such as will prove the most injurious to himself and to those depending upon him. In other less questionable cases of derangement, and where the disorder is so restricted as to leave the patient, according to appearances, the exercise of a great portion of his reason, it is often difficult to come to a determination as to the propriety of seclusion. The opposition which the patient may experience may endanger the portion of intelligence that remains. It is as unnecessary as it is cruel to deprive a person oppressed by distressing feelings, or prone to terror or alarm, of his friends and relatives—of the attentions of his family—as long as he entertains no vindictive feelings or dislike to them, and especially as long as his actions may be reasonably controlled by them.

407. *a.* In the state of gloom and mental depression to which some persons, the subjects of moral insanity, are prone (§ 73), seclusion may be productive as readily of mischief as of benefit. For these, travelling, visiting watering places, medical treatment, the kind intercourse of those to whom the patient is partial, and the watchful attentions of the members of his family, or of those accustomed to attend upon persons in this state of mental affliction, should be tried before seclusion be resorted to. When suicide is contemplated, seclusion and control in an asylum will prove more successful than the most careful attentions in the bosom of the patient's family. Still, in the majority of such cases, this measure will be more successful chiefly in respect of the safe custody of the patient; for none besides will be equally secure. The most vigilant keepers may be deceived by him when he is otherwise at large.

408. *β.* When the disorder is characterized by unnatural excitement (§ 74), seclusion and confinement are often requisite, and are generally successful by inducing reflection. When persons thus affected have a propensity to intoxicating liquors, accessions of mania being thereby occasioned, seclusion is necessary; but upon the restoration of liberty the morbid disposition returns. In all cases of moral insanity where the morbid propensity is dangerous to the patient or to others, this measure becomes indispensable. When the disorder assumes a religious character (§ 75), travelling, society, and a suitable moral and medical treatment are preferable to seclusion; and confinement ought not to be resorted to unless suicide have been attempted or contemplated.

409. The treatment of all the forms of moral insanity ought to be essentially, although not exclusively, *moral*. Comparatively few instances of these do not present more or less of physical disorder, seated either in the head itself, or in some organ with which the brain sympathizes. Of this I have already adduced sufficient evidence (§ 92–94). The moral treatment in all these must be based upon a knowledge of the remote causes of individual cases, and should vary with the circumstances of each. It is impossible to state here in what this treatment should consist with reference to such circumstances; the subject will be as fully treated of hereafter as my limits will permit. Wherever physical derangement can be detected, or to whatever organ it can be referred, appropriate medical means should be directed against it, while the patient is enjoying the advantages of a suitable moral management. The general health should receive due attention; and the functions of digestion, secretion, and excretion be duly promoted. Due restraint ought to be, as far as possible, imposed upon the passions and emotions, and change of air, wholesome exercise, and interesting occupations be prescribed.

410. *γ. The treatment of erotomania* should have reference chiefly to disordered circulation in the brain occasioned by an excited imagination and protracted desire, in connexion with great susceptibility of the nervous system generally. If this affection be not alleviated, it will pass into more general disorder of the mental powers; especially into melancholia, mania, or

some form of dementia. When it occasions emaciation and hectic fever, thereby menacing the life of the patient, marriage may be suggested. In this, as in nostalgia, the accomplishment of the desires of the patient is the chief or only remedy. When the object of desire is concealed, every art should be tried to ascertain its nature and source, as the effects upon the mind that will consequently result may be of much service, and a moral influence may be exerted over the patient with greater advantage. Where marriage is impossible, change of scene, travelling, society, and the amusements of watering places, a tonic and restorative treatment, healthful and pleasant occupations, exercise in the open air in agreeable company, and suitable diet and regimen, are chiefly to be depended upon. When there is any evidence of increased determination of blood to the head in this, as in other forms of moral insanity, and especially when the scalp is hot or the eyes injected, the tepid or cold shower bath every morning will be found of great service.

411. *b. The morbid propensity to intoxication* (§ 86) is often attended by symptoms indicating not only a state of irritation of the stomach, but also a general depression of the nervous power. In this state, tonics, with small doses of ammonia, may be used with advantage; and, in order to counteract the injurious effects of the intoxicating fluids upon the system, to prevent the disorder from leading to more general and severe derangement of mind, and to disgust the patient with these fluids, tartarized antimony, ipecacuanha wine, or other nauseating drugs, and even the extract of elaterium or croton oil may be added to them before they are partaken of by the patient. In two cases, one of which I attended with Mr. HOOD, this method was found successful in causing a loathing of these fluids, in moderating the mania consequent upon the use of them, and in permanently restoring the patients. In both these cases, seclusion, and a sufficiently permanent and close restraint, could not be conveniently put in practice: this plan was, therefore, tried in the first instance, and succeeded in causing a distaste of all kinds of intoxicating liquors. To succeed, however, by means of it, requires great care and management on the part of the friends of the patient.

412. *c. Homicidal insanity* (§ 89) *and incendiarism* (§ 88) are generally dependant upon an irregular activity of the circulation, or a morbid state of vascular action, especially in the brain. They are both frequently connected with disorder of the uterine organs, or suppression of the catamenia; and, in males, with derangement of the digestive organs, and with sanguineous determination to the head. Medical treatment in these cases is mainly to be trusted to; for the morbid impulse to commit these crimes is often so violent as to be instantly carried into effect, either before moral restraint can be exerted to counteract it, or because this restraint is habitually so feeble as to be inefficient, or is not roused to the least degree of activity. The impulse to perpetrate such crimes may, indeed, be looked upon as one of the modes in which physical disorder of the brain, arising either primarily or sympathetically, deranges the manifestations of mind—those sentiments or propensities which circumstances have called into activity being thereby disordered or morbidly exalted. In many instances, also, there is reason to believe that the morbid impulse to commit crime is only the climax of an habitual indulgence of passion and feeling, to the constant neglect of moral principle and restraint, and is a tolerably obvious consequence of cerebral excitement, the effects of which are determined or manifested in this particular manner or direction, owing to various predisposing and concurring sentiments and circumstances.

413. In these cases, local or general depletions, according to the amount of local or general fulness, or of increased vascular action; the cold douche, cold affusion, or shower bath; active purgatives, revulsants, and derivatives; antimonial and other diaphoretics; digitalis and other sedatives; and the promotion of the secretions and excretions generally, constitute the chief principles of treatment, aided, however, by a due moral influence, and by proper mental and physical occupation.

414. *b. Partial disorder of the understanding* (§ 95) appears under so various and numerous forms as to require a treatment appropriate, not only to each of these, but also to individual cases. Each patient should be a particular subject of study, and the moral and physical treatment directed according to the character and stage or duration of the disorder, and the various circumstances connected with its development.—*a. Hypochondriacal monomania* is generally an extreme state of *hypochondriasis*, and more or less intimately connected with physical disorder, commonly commencing in the digestive organs, and consecutively affecting the brain. The treatment should not be materially different from that which I have recommended for that disease; and the *hygienic means* there advised (see HYPOCHONDRIASIS, § 50), especially, should be adopted. In the majority of cases, complete seclusion will not be necessary, unless the patient contemplate or attempt suicide. More generally, however, travelling, change of scene and of air, horse exercise, agreeable occupations, hunting, the amusements of society and of places of resort—especially when attended and controlled by friends or suitable persons—will be found most conducive to recovery, particularly if an appropriate medical treatment, and the use of mineral waters of a restorative and deobstruent or laxative kind, be pursued at the same time. Every method should be tried, and especially those just mentioned, to abstract or seduce the patient's attention from those feelings and ailments with which his mind is exclusively and morbidly occupied. The strictly medical means should be varied according to the peculiarities of individual cases; and the more urgent symptoms should be palliated by suitable remedies. The bowels ought never be allowed to become costive, and their functions should be promoted by aperients, conjoined with tonics, carminatives, and deobstruents. All the secretions and excretions should be duly promoted. Flatulence and gastrodynia must be allayed by magnesia, the hydrocyanic acid, gentle tonics, &c., variously combined; and by spare diet, consisting chiefly of warm milk, with bread or boiled rice, or other farinaceous articles.

415. *β. The treatment of melancholic monoma-*

nia (§ 106) is most difficult, and, to be successful, requires a strict examination of the physical and moral causes of each case, and an appropriate employment of moral, hygienic, and medical means.—(*a*) *Moral treatment* is of the greatest importance in this form of insanity, and in all its modifications, whether religious, or demonomaniac, or misanthropic, melancholia, or any other it may assume; but this part of my subject will be more appropriately considered hereafter.

416. (*b*) *The hygienic measures* that may be resorted to consist chiefly of attention to climate, residence, exercise, clothing, and diet. The patient should *reside* as much as possible in a moderately warm, or temperate and dry air, or in a mild climate and a clear atmosphere; and if he must abide for a time in a place where these advantages are not enjoyed, he should choose spring and summer, and migrate during autumn to the milder climate, where he should reside during the winter and early spring months. The patient's *clothing* should be warm, and consist of flannel nearest the skin; and this should be frequently changed. As melancholics are subject to cold feet, these parts should be carefully protected.

417. (*c*) *Seclusion*—at least complete seclusion—should be prescribed with great circumspection. There can be no doubt of its propriety when suicide is contemplated, or has been attempted. But in other cases, partial seclusion, particularly in connexion with agreeable and interesting occupation and amusement, is more safe and beneficial. Seclusion, however, even when complete, often re-establishes the moral powers and the reasoning faculties when they are exhausted by indulgence of the passions and desires.

418. (*d*) *Exercise* and suitable *occupation* are very important parts of the treatment of melancholia, and of all the states of partial insanity. Travelling, voyaging—especially to a considerable distance, and with a fixed object, or with feelings of interest in what may result or occur—is one of the best means that can be devised. Exercise on foot or on horseback, regularly taken, so as to promote the cutaneous excretion; occupations in the open air, which are attended by moderate physical exertion and mental excitement; hunting, shooting, and games of skill and activity, as cricket; and farming and gardening, are severally of great benefit. The chief objection to the last of these is the occasional stooping necessary to several of its duties. Billiards are also useful means, both of exercise, interest, and amusement. Whatever moderately excites, interests, or occupies the mind, is serviceable in the treatment of melancholia; and especially if it, at the same time, abstracts the attention or imagination from the object of its illusion. When *music* is properly selected, and prosecuted so as to accomplish these objects, the advantages that may be derived from it are great. As to the selection of modes of occupation and exercise for individual cases, much should depend upon the patient's previous and existing tastes and habits. A principal intention in this class of disorders, in all forms of partial insanity, is to detach the patient's attention, his mental devotion, from the object on which he has morbidly fixed it, to seduce it to other objects, and to engage it with different subjects and matters of interest and importance.

419. (*e*) *The diet* of melancholic patients should be light, digestible, and moderately nutritious. Salted, highly-spiced, irritating, and oily or fat articles of food ought to be always avoided. The food should be simple, plainly dressed, consisting of very few articles at the same meal. Ripe and fresh fruits, in due season, may be allowed. The quantity and kind of food should have reference to the amount of exercise. When this is so great as to freely promote the cutaneous, biliary, and alvine evacuations, a more liberal diet may be permitted than in other circumstances. Great circumspection is requisite in allowing this class of patients restorative or exciting liquors. If the head be cool, and the action of the carotids rather below than above the healthy standard, these may be tried in small or very moderate quantity, and their effects observed. Generally, however, the influence of gentle tonic and restorative medicines should be previously tried.

[It is believed that a rather generous diet of a mixed kind is more generally adapted to the treatment of the insane than one of a lowering or antiphlogistic nature; but it is, of course, to be conformable to the general curative plan of the individual patients. Much will depend on the previous habits and manner of living. The diet should, of course, in all cases be ordered by the physician, and, as in other diseases, adapted to the state of the patient and his digestive organs, which vary according to temperament, age, previous manner of living, and particular idiosyncrasies.]

420. (*f*) *Medical Treatment.*—The physical disorder requires, simultaneously with the adoption of the foregoing measures, and of suitable moral means, a judicious recourse to remedies calculated to promote or to correct the functions of the digestive organs, and, indeed, of all the abdominal viscera. There are very few of these viscera which have not betrayed more or less of disorder even long previously to the development of the mental affection. The functions of the skin are usually impaired, and often require the tepid or the warm bath for their restoration. The alvine excretions, especially the intestinal, are generally retained, or voided imperfectly or with reluctance, owing manifestly to relaxation of the muscular tone of the bowels, and especially of the colon. The secretions are also deficient, and morbid from their retention. These physical conditions require for their removal the frequent use of aperients and laxatives, conjoined with tonics and other restoratives; for their continuance would increase that state of excrementitial plethora of the vascular system in which melancholia and hypochondriasis often originate, by depressing and disordering the vital manifestations of the brain. Even the urinary secretion is deficient, the discharge of the more excrementitious materials from the blood by the kidneys being partially interrupted, or deficient in respect of certain of the constituents of the urine. In most instances, the morbid materials carried into the circulation, or accumulated in it, owing to defective powers of digestion and assimilation, are not sufficiently discharged from it by the action of the kidneys,

bowels, liver, and skin; and thus the impure state of the blood influences the manifestations of the nervous centres. In such circumstances, the restoration of these functions, by suitable hygienic and medical treatment, is always a principal indication of cure.

421. The chances of recovery from melancholia may be almost said to be great in proportion to the manifestation of disorder in the organs of digestion. As the pathological causes of the mental affection show themselves the more evidently, the greater hopes may be entertained of the disappearance of the latter with the removal of the former. Where these exist, the therapeutical intentions should be directed accordingly. If the function of any organ be impaired or interrupted, the restoration of it is indicated; if the hæmorrhoidal or catamenial evacuation is suppressed, means should be taken to re-establish it; if a cutaneous eruption have disappeared, or an accustomed ulceration or issue ceased to discharge, the skin should be acted upon, or some analogous mode of derivation and counter-irritation be adopted. It is, however, not always, nor even frequently, that melancholia can be referred to these, or equally manifest sources, and where such very obvious indications of cure as these present themselves. Still, there are generally to be observed certain conditions of the abdominal organs, of the cerebral and general circulation, and of the nervous system, which severally require attention, and furnish the basis of a rational method of treatment.

422. Where the functions of the digestive organs are sluggish, the bile is morbid, dark, irritating, or scanty, and the various secretions and excretions insufficient for the due purification of the blood, or for the preservation of it in a healthy condition, it is clearly indicated to restore these functions by means which shall impart a new impetus to the vital endowment of their respective organs, and enable them regularly to perform their offices. In a very large proportion of cases, not only is the bile morbid, but the whole abdominal secretions are disordered, and certain of them are retained on the intestinal mucous surfaces, or even accumulated in the cæcum and colon. The frequency of these changes, and the benefit resulting from the more certain means of removing them, induced the ancients to have recourse to black hellebore, and the moderns to milder cathartics, to purgatives or to laxatives, in the treatment of this malady; and the propriety of the practice, when the means are well selected and combined, and judiciously managed, cannot be disputed. In some cases, especially where there is much torpor of the biliary apparatus and of the bowels, with accumulated sordes on the digestive mucous surface, a brisk *emetic*, or even an *emeto-cathartic*, is of great service early in the complaint and at the commencement of the treatment. When the strength of the patient will permit, a continued action on the bowels—an artifical diarrhœa—should be kept up, by means of chologogue or stomachic purgatives or aperients, for a considerable period; and purgative enemata may also be employed. A combination of the compound infusions of gentian and senna, with a neutral salt, and an aromatic spirit or tincture (F. 266), will be appropriate in these cases, and the spirit of turpentine, with castor or olive oil, may be prescribed in enemata. A similar means to these, of which a variety will be found in the *Appendix*, and in the articles HYPOCHONDRIASIS and INDIGESTION, may be employed according to the peculiarities of individual cases. When the patient believes that his physical health is not in fault, or when there is a disposition to sanguineous determination to the head, JAMES's powder, or tartarized antimony, may be given in small and frequently repeated doses, so as to keep up an action upon the skin or bowels, and to induce a feeling of bodily ailment, so as to dispose the patient to pursue a suitable treatment.

423. When indications of congestion of the brain, or of determination of blood to this part, or of general vascular plethora, or of inflammatory irritation of the gastro-intestinal mucous surface, or of fulness of the portal system, are observable, and especially if they have become more evident after the disappearance of an accustomed evacuation, general or local bloodletting should not be delayed. Local depletions are generally most appropriate in these circumstances, and ought to be decidedly employed, particularly in the more robust. ARETÆUS permitted blood-letting only in the young and robust in this complaint, and in small quantity, and chiefly in spring; CULLEN considered that it was rarely useful; PINEL seldom employed it; and ESQUIROL advised it in nearly the same circumstances as I have recommended it. The application of leeches, and even the repetition of them, to the vicinity of the vulva, or around the anus, when the catamenial or hæmorrhoidal evacuations have been interrupted, or the portal system congested, and to the epigastrium or hypochondria, or behind the ears, when uneasy sensations are referred to the enclosed organs, is generally attended with benefit; and this evacuation may be repeated even oftener than once, and commonly with advantage, although it may be requisite to administer tonics, antispasmodics, or restoratives at the same time.

424. Many cases of melancholia present a morbid susceptibility and sensibility of the nervous system. The patient is remarkably nervous, and his distress is evidently heightened by sanguineous depletions, however moderate, and by purgatives if too frequently exhibited, or even if they operate beyond the mere evacuation of the bowels. LORRY has well described this form of melancholy, and very properly recommended for it calming measures—opiates, with gentle stimulants and restoratives. In these cases, the warm or vapour bath, the tepid or warm douche, the affusion of warm or tepid water on the head, and the tepid bath, according to circumstances, will be of great service. Small doses of camphor, with opium, morphia, or hyoscyamus, or with the extract of poppy or lactucarium; the infusion or the ammoniated tincture of valerian, or both conjoined; the infusion or tincture of hop; and other antispasmodics and diffusive stimulants, variously conjoined with sedatives, narcotics, &c., and a pure, dry air, change of scene, and light food, are generally beneficial in this state of disorder. If there be watchfulness and irritability, the hop-pillow, or the sirup of poppies, or the compound tincture of camphor, in

a small enema, will afford relief. When the disorder has been caused by masturbation, the cold affusion or shower bath, the cold plunge bath, and tonics, especially the muriated tincture of iron, should be prescribed. As the energy of the nervous system returns, more permanent and energetic restoratives and tonics may be employed; but during their use the secretions and excretions ought to be carefully promoted, and the bowels kept freely open, care being taken to prevent congestions of the brain or portal system.

425. In many instances, a combination of the several indications based upon the conditions of the abdominal organs and of the vascular and nervous systems, and the association of more or less of the means required to fulfil these indications, are often both necessary and successful. Thus, it is frequently of the greatest advantage to act energetically upon the bowels by means of stomachic or chologogue purgatives; to deplete the vascular system, either generally or locally; and, at the same time, to give stimulants, antispasmodics, and tonics, the choice of the several means depending upon the characters and symptoms of individual cases. As to the propriety of exhibiting the more active tonics in melancholia, much doubt may be entertained; but if accumulations of morbid matters in the bowels have been removed; if the tongue be clean, moist, or watery; if the secretions and excretions have been improved, and if a trial of them be not productive of headache, of increased heat of the scalp, or of feverishness, the use of them may be persisted in, care being taken to keep the bowels freely open, and to guard against local fulness or determination of blood. The diet, regimen, and the management of convalescence, require no remarks beyond those which have already been made (◊ 402–405).

426. *c. Demonomania*, in its different forms, and especially *theomania*, or various states of religious insanity (◊ 121, *et seq.*), require a somewhat similar plan of treatment, and the same indications of cure, as have been recommended for melancholia, with which they are more or less closely allied. Moral treatment is particularly necessary, but, equally with the physical, should be varied according to the peculiar features of individual cases. In all the modifications of religious insanity, the consolations of religion, administered by sincere, moderate, and rational ministers of it, are of the greatest service. I have witnessed this in several cases; and, when judicious moral and religious management is aided by a sound physical treatment, recovery will take place in the great majority of instances. In no form of insanity is greater care requisite than in this, to protect the unfortunate patient, and his near relatives, or members of his family, from his insane impulses to commit suicide or murder. PINEL states that a person, after listening to an alarming sermon, considered himself as irretrievably lost, and murdered all his children, in order that they might not experience eternal damnation. ESQUIROL mentions the case of a woman who entertained a similar idea, and attempted the lives of her children to preserve them from punishment in a future world; and numerous other instances of the same kind might be adduced. When persons thus disordered succeed in their horrible design, they rarely recover; for no sooner is reason restored, than the distress experienced by them, when reflecting upon the act they have committed, occasions a return of the malady.

427. The physical disorder, both antecedent to, and coetaneous with the mental disorder, should be carefully investigated; and particular attention devoted to the states of the brain, of the digestive organs, and of the uterine functions; and determination of blood to the head prevented by local depletions, the shower bath, or douche; by derivatives and aperients. In the more robust and young, the preparations of antimony, in small doses, and occasionally in larger quantity, so as to produce vomiting, are often of service.

428. In those cases where the patient entertains the belief that he is changed into some animal, or that he has changed his sex, or that he has lost a portion of his body, or that he carries about with him a living thing, or some strange substance in his abdomen, or that some singular matter is substituted for one of his organs or members, and acts from this impression, the success of treatment is often not great. In many of these there is reason to suspect physical disorder, if not structural disease, in the organ or part to which the insane delusion is referred; and to that organ the investigation and the treatment should be especially directed.

429. *B.* TREATMENT OF GENERAL INSANITY. —*a.* OF MANIA.—In treating mania, it is necessary to have a most intimate regard to the stage of the disease—to the degree of general and cerebral vascular action and vascular fulness—and to the state of the secretions and excretions. The means which will prove most beneficial during the acute stage, and especially in the early part of it, will be inappropriate, or even injurious, in the chronic period of the malady. The treatment of mania is both *hygienic* and *pharmaceutical*. The former comprises various moral, intellectual, and physical means; the latter, the internal remedies intended to subdue morbid action, and to restore the healthy functions.—*a.* At the commencement, and during the early or *acute stage* of the malady, the patient should be placed in a large, darkened, and well-ventilated apartment, the air of which should be fresh and cool. Unless his violence is extreme, he ought to be allowed the full range of that, or even of an adjoining apartment, in the watchful care of sufficient attendants; and the restraint even of the strait waistcoat should be dispensed with, unless urgently required. Complete *seclusion* is most necessary, and it should be preferably conducted in a large institution, conformably with what has already been advanced on this subject (◊ 391). All means of irritation or excitement should be prevented, as far as may be compatible with safety to the patient and those around him. The visits of relatives, connexions, or even of acquaintances, should be prevented, and the patient ought to be exposed to the smallest possible number of impressions and causes of excitement. The diet should be rigidly antiphlogistic, and cooling diaphoretics, refrigerants, and diluents prescribed. The nitrate of potash, the muriate of ammonia, the solution of the acetate of ammonia, the spirits of nitric

æther, the solution of tartarized antimony, camphor julep, &c., may be severally used as refrigerant diaphoretics, or administered in the patient's usual drink; or any of the articles prescribed in the *Appendix* (F. 588, *et seq.*) may be employed with this intention.

430. In this form of insanity, patients ought neither to be retained in their own houses nor confined to their beds. If they are turbulent, vociferous, and violent, their extravagance should be allowed to exhaust itself without being perpetuated by the excitement of contradiction, irritating coercion, or violence, unless in as far as coercion is indispensable; and, as soon as it shall have served its purpose, it should be relaxed. Soothing means, with firmness, and decision when circumstances require it, should always be tried, and never be departed from, even when the utmost restraint is also imposed. The perceptions of the maniac are seldom so entirely obscured as to render him incapable of understanding kind and soothing treatment, or to make him altogether insensible of considerate modes of having recourse to coercion: this has been proved by the able management of cases of this malady in the County Asylum, by Dr. CONOLLY. M. ESQUIROL also observed that coercive means should not be resorted to until the maniac risks his own life, or the lives of others; and even then they should be temporary, and be laid aside as soon as a calm takes place. When the patient will not pass the night in bed, it is better to leave him unrestrained than to coerce him, if he evince no mischievous tendency. This writer has found that the more that liberty has been granted to maniacs, without compromising their safety, the fewer have been the instances of furious mania, and the more rare the instances of the supervention of apoplexy and paralysis: complications not infrequently produced by the irritation and excitement caused or perpetuated by unnecessary or prolonged restraint, or by restraint imposed in a harsh, unfeeling manner. The *moral treatment* should be conducted conformably with the principles which will be stated hereafter.

431. The *diet* may be more liberal as the disease passes from the acute to the more chronic stage; but in all periods, hunger or thirst, if not appeased, augment the irritation and violence of the patient. The food should be of the most digestible and least exciting kind. In some cases, at the commencement of the attack, all food is refused; but this repugnance wears off in a few days. Coercion, in such instances, is unnecessary, as the dislike arises either from gastric disorder, or from excessive cerebral excitement; and, in both circumstances, abstinence is a necessary part of the treatment. At a more advanced period, the farinaceous and leguminous articles of diet, warm milk with bread, rice and milk, ripe and seasonable fruits, and the white meats, are the most appropriate. The *drink* should always be cooling and febrifuge, as already advised (§ 429).

432. *β.* The *strictly medical treatment* requires the calmest consideration; the spirit of system, and an irrational method of routine, should be altogether banished; the means of cure should be appropriate to the peculiarities of each case at the time of prescribing for it. The exact pathological or physical conditions should be ascertained as correctly as possible, and remedies prescribed accordingly; and with due reference to the age, habit of body, temperament, modes of living, and occupations of the patient; to the predisposing and exciting causes, to the season, and to the stage and previous character of the disease. At the commencement of the attack, and if gastric disorder is manifest, one, or even two, *emetics* of tartarized antimony, dissolved in barley water, or in any other diluent, should be exhibited; but if there exist general plethora, as well as inordinate vascular action in the head, a full *blood-letting* should precede the emetic. After the operation of this latter, increased action should be moderated by the continued exhibition of the solution of antimony with liquor ammoniæ acetatis. It is sometimes requisite to repeat the blood-letting, especially if redness of the face or eyes, noises in the ears, a pulsating pain in the temples, or increased heat of the scalp, or augmented action of the carotids, still continue. When the first blood-letting has been copious, a local depletion may be sufficient, as *cupping* behind the ears or in the nape; or the application of *leeches* to the temples, or around the base of the head, or even to the anus. Great care is requisite not to bleed too much; for if maniacs be too much reduced by sanguineous depletions, they are apt to lapse into dementia or imbecility.

433. After the operation of the emetic, a full dose of *calomel*, either alone or with JAMES'S *powder*, may be given, and its operation promoted by some active *purgative* taken a few hours afterward, and preferably, according to my experience, by half an ounce, or six drachms each of castor-oil and spirits of turpentine, in any suitable vehicle. If the action of these be tardy or insufficient, it may be promoted by the same or other active cathartics prescribed in enemata. If the cerebral excitement continue after these, or return, the *warm* or *tepid bath*, or a bath of an intermediate temperature, may be used, the patient remaining in it for a considerable time; *cold lotions* being applied to the head, or cold water being affused upon it. The bath may be resorted to, in this manner, every time that the delirium becomes violent. The bowels should be kept freely open during the attack, and the cooling *diaphoretics* already noticed, with *diuretics*, should be taken every four or five hours, particularly the solutions of the acetate of ammonia and of tartarized antimony with the spirits of nitric æther. The patient's head ought to be kept cool by the usual means; and if the heat be at any time considerable, the *ice-cap* or the *cold affusion* may be used.

434. When the violence of the symptoms is abated, the patient may be allowed more liberty, and permitted to enjoy the open air, where he may give vent to his excitement, which will the sooner pass off by being unrestrained. The *diet*, which was heretofore extremely restricted, may be more liberal; and, if intervals of reason occur, the utmost kindness and interest should be manifested for the patient, the *moral treatment* coming in aid of the *physical* and *medical* during the whole course of the malady. If critical evacuations are manifested, they should be promoted by a more nutritious regi-

men, by gentle tonics, or by means appropriate to the crisis that may appear.

435. The treatment is no longer rational, if all the periods and all the modifications of the disease are treated in the same manner. If mania have occurred after the suppression of an accustomed sanguineous discharge, early blood-letting, and, subsequently, *local depletions*, repeated at intervals, and in situations having reference to the accustomed evacuation, are indispensable. If it have appeared after delivery, or upon the suppression of the lochia, or of the milk, *purgatives*, *blisters*, *derivatives*, and *revulsants*, *setons*, or *issues*, &c., are necessary. If it have followed some acute disease, upon too rapid growth, or on masturbation, the warm bath, with cold applications to the head; a nutritious and *milk diet*; the use of *asses' milk*, *tonics*, *cinchona*, or *quinine*, with acids; the cold *shower bath*, or *salt-water bathing*, will be most useful. But in all cases—and especially when the mental disorder has supervened upon the disappearance of some cutaneous eruption, or of gout or rheumatism—aperients, purgatives, blisters applied to the nape and kept open, or setons there, or other permanent irritants of the skin, will be found of service.

436. When mania appears in persons of a highly nervous temperament, it is generally independent of vascular fulness, or sometimes is even owing to a deficiency of blood, a larger proportion being determined to the brain than to the rest of the body. In this case, the *cold affusion* on the head, while the lower part of the body is immersed in a warm bath, or the *shower bath*, the patient standing in a pan of warm water, is generally beneficial. If the disease be attended by irritation of the reproductive organs, *tepid baths*, *cold enemata*, and the internal use of the *acetate of lead* with *hyoscyamus*, or of *ipecacuanha* with *opiates*, or *camphor* with *vinegar*, will be of service. In most cases characterized by nervous symptoms chiefly, the infusion and other preparations of *valerian*, small doses of camphor or of asafœtida, and *prussic acid* or *laurel water*, will be of use, when cautiously administered. In these especially, the cold *douche*, or affusion on the head, has both a physical and a moral effect in calming the patient.

437. If the disease resist these means, rationally and appropriately employed, other remedies, of a more perturbating or empirical kind, may be tried, but these require the utmost caution, and their effects must be carefully watched. In strong, young, plethoric, and well-fed persons, blood-letting, generally or locally, may be repeated. When the propriety of venæsection is doubtful, small and repeated local depletions should be adopted, and those which may have a derivative effect ought to be preferred; as four, five, or six leeches applied to the anus, and repeated every ten or fourteen days, according to the strength of the patient. The *semicupium*, cold application to the head, and *purgatives* with colocynth or aloes, will also be required; and if these occasion a hæmorrhoidal affection, the circumstance may have a favourable influence on the mental disorder.

438. *Drastic purgatives* are often of service, and particularly in the more obstinate states of mania. They frequently bring away brown, greenish, tenacious, and otherwise morbid secretions, which had been long adhering to the intestinal mucous surface, or lodged in the cells of the colon and in the cæcum, and which had either predisposed to or perpetuated the mental disorder. In some instances, a long course of purgatives is required fully to evacuate these accumulations; but when this is necessary, the patient's strength should be prevented from sinking by a fuller diet and a more restorative regimen than would otherwise be requisite. It is often difficult to administer these medicines so frequently, or in such quantity as may be necessary, as maniacs are often persuaded that they are given to poison them; but such substances as may be taken in their food—as calomel, croton oil, elaterium, &c.—may be employed. *Croton oil* may also be rubbed over the abdomen, and cathartic enemata liberally administered. In cases of this kind, the croton oil may be prescribed in small doses, with the extract of colocynth, or the compound camboge pill; and, when the patient has no reluctance to medicine, the compound infusions of gentian and senna, with the sulphate of potash, and some purgative and carminative tincture; or a draught containing equal parts of castor-oil and spirits of turpentine may be preferred. If the purgatives occasion any increase of irritation, or are sluggish in their action, the warm or tepid bath will be found of great service.

439. When the integuments of the head appear engorged with blood—and when, in the advanced course of the disease, or in its chronic state, the head or scalp seems congested—small and repeated *cuppings* behind the ears, or on the shaved scalp of the occiput, will often be serviceable; or *free incisions* may be made in this latter situation, as advised by Dr. PRICHARD, and kept open by lint, or by pease, in the manner of a common issue. In chronic cases, *moxas* and the *actual cautery*, applied to the occiput and to the nape, have been recommended by many Continental physicians; but the other measures just named, or setons or issues in these situations, are equally efficacious.

440. The propriety of exhibiting *opium* in mania has been much doubted. But, when sanguineous depletions have been duly prescribed, and morbid accumulations in the bowels freely and entirely evacuated, if the scalp be neither remarkably hot, nor congested with blood, and if there be great restlessness, irritability, and want of sleep—the maniacal excitement being the result rather of nervous disorder than of vascular action—the judicious exhibition of opium, or of *morphia*, especially in conjunction with other appropriate medicines, will often be productive of the greatest benefit. The opium or the morphia, however, should be given in a full or very large dose; and, according to the peculiarities of the case, it may be conjoined with *camphor*, or *digitalis*, or JAMES's *powder*, or *ipecacuanha*, or calomel, or with an alkaline carbonate, or with aromatics. There can be no doubt of the benefit which camphor may produce in this state of mania, although this also has been disputed. Those who possess weak powers of discrimination, whose knowledge of morbid actions and of the operation of remedies is deficient or limited, will frequently fail in obtaining the usual advantages from medicines, and will hence parade their

skepticism as a mask for their ignorance; but *camphor* is a valuable remedy in the circumstances of the disease now under consideration, yet it requires caution; and, when conjoined with nitre, and given in small doses in the more doubtful cases, or where heat of the scalp is still present—or when prescribed with hyoscyamus, opium, or digitalis, or with vinegar, and in larger doses in the chronic states, and after evacuations have been energetically employed and exhaustion is about to supervene—it generally is productive of the greatest benefit. If the premature or inappropriate use of it should increase the restlessness or heat of the scalp, cold applications to the head, and diluents with vinegar internally, will soon remove all disorder, or even develop its good effects. *Vinegar* was much praised by Aretæus, Locher, and others in this malady; but Chiarugi advised it to be given with camphor. One drachm of the latter may be dissolved in about two ounces of distilled vinegar, and from an eighth to a fourth part of the solution may be taken in any suitable vehicle every four, five, six, or eight hours. *Digitalis* has been recommended by Dr. Locher, of Vienna, and by several British physicians, in this and similar states of mania; and when exhibited in full, or even large doses, it sometimes is of great service; but its effects require most careful watching, especially when employed in the way most likely to prove beneficial. The *surprise bath*, or sudden immersion in the sea, or in a cold bath, as advised by Van Helmont and others, as well as the *rotatory machine* of Darwin, although recommended by some writers, are dangerous and highly empirical modes of treatment, which are now justly abandoned.

441. *γ.* When mania assumes an *intermittent form*, the same principles of treatment as have now been advocated should be followed during each attack; and, when an intermission takes place, means should be used to prevent the accession of a paroxysm. *Cinchona* and *sulphate of quinia* have been employed with this latter intention. Where vascular fulness and increased action, generally and locally, have been removed, and morbid secretions and fæcal accumulations have been entirely evacuated from the biliary organs and intestinal canal, the sulphate of quinine, conjoined with camphor, and with as much of the purified extract of aloes as will promote a free action of the bowels, and occasionally, also, with hyoscyamus, will prove useful during the intervals, if neither heat of scalp, headache, nor want of sleep, follow the use of it. My opportunities of resorting to this combination of means, in this particular state of disorder, have been few; but I have found the following of service:

No. 270. ℞ Quinæ Disulphatis, Camphoræ rasæ et subactæ, ää ʒss.; Extr. Aloës purif., ʒss. ad ℈ijss.; Extr. Hyoscyami, ʒj.; Sirupi Simp., q. s. M. Fiant, secundum artem, Pilulæ L., quarum capiat duas vel tres, bis terve in die.

442. When the patient has become calm, and begins to recognise his position and state, although some delusion or delirious excitement may remain or recur, or the moral affections may not be altogether restored, it will generally be proper to remove him from the place to which he had been confined, and to surround him with novel objects, by which he may be amused, or his mind more agreeably engaged, and where he may enjoy the advantages of air and exercise. In this stage of the disorder a more nourishing and strengthening diet and regimen may be permitted. But at all periods the strictest attention should be paid to the secretions and excretions, as well as to calm the mental irritation, and to diminish the number of impressions and causes of excitement by which this irritation is perpetuated.

443. *δ. The convalescence* of maniacs is often prolonged and difficult; sometimes it is rapid. Some patients, when restored to their friends, to society, and to their natural habits, do not recover a complete state of health until many months have elapsed. These, especially, manifest great susceptibility and sensibility: they are readily vexed or irritated, are ashamed of their former condition, and often entertain fears at meeting with former friends. Some entertain a dislike, or a hostile feeling, to friends or persons who interested themselves in their behalf during their illness. Where this is evinced, the probability of a relapse, or of an attack of melancholia, or of an attempt at suicide, is great. Convalescents are generally very greatly benefited by travelling some time, or by a sojourn in the country, or in some suitable place, before they are restored to their families, and are brought in intimate communication with their relatives and friends, or with those who were witnesses of their malady.

444. *b.* Treatment of Dementia and Fatuity.—The various states of dementia and fatuity generally present little hopes of success from either hygienic, moral, or medical treatment.—*α.* That variety which M. Esquirol has denominated *Acute Dementia* (◊ 152) is, however, very generally remedied by a restorative method of cure: by walking and *horse exercise*; by the *shower bath*, followed by frictions of the surface; by light and nutritious diet; by *stomachic aperients*, and attention to the secretions and excretions generally; and by the exhibition of *antispasmodics* and *tonics*; especially valerian, musk, cinchona, ammonia, camphor, sulphate of quinine, &c., combined according to circumstances. The sulphate of quinine, conjoined with camphor, hyoscyamus, and as much aloes as may preserve the bowels gently open, is often of great service in these cases. The preparations of valerian with ammonia are also most useful. When evacuations have been suppressed or eruptions have disappeared, these should be recalled, or others substituted in their place.

445. *β.* The *chronic* or *confirmed forms of dementia* and *fatuity* (◊ 152, *et seq.*) require a *diet* and *regimen* suited to the peculiarities and circumstances of each case, and to the amount of exercise which is allowed, or the patient is capable of taking. In addition to strict attention to the states of the secretions and excretions, the *shower* or *cold bath*, or sea-bathing, followed by frictions of the surface; *blisters* applied behind the ears, or to the nape, and either frequently repeated, or kept open; *setons* or *issues* in the same situation; *moxas* applied to the occiput; *incisions* of the scalp, or the production of pustules on the shaved scalp by means of the *tartarized antimonial ointment*, are the chief remedial means. In many cases, these should be conjoined with the restorative treatment just advised (◊ 444). In a very few instances,

the occurrence of an attack of acute mania has had a critical effect. In all cases, country air, moderate exercise, and such occupations as the incoherent, imbecile, or overthrown state of the mental powers will admit of being attempted, will prove of service, at least as respects the patient's bodily health.

446. *C.* The Treatment of Complicated Insanity (§ 162, *et seq.*) is the most hopeless, especially when any of the forms of dementia are associated with *general paralysis*.—*a*. The means which have been just enumerated (§ 445) are usually required in this complication; and care should be taken to prevent the bowels from becoming too *constipated* on the one hand, or too much *relaxed* on the other. In either case, inflammation, rapidly passing into sphacelation, generally results. In some instances, the removal, by mechanical means, of hardened fæces from the rectum becomes necessary when the constipation has been prolonged. *Retention of urine* is an equally frequent and dangerous occurrence in the paralytic form of imbecility and incoherency, and requires a frequent recourse to the catheter. *Incontinence of urine*, or a frequent dribbling, owing to over-distention of the bladder, is also a common symptom. In this latter case especially, care should be taken to keep the patient dry and clean, as unconscious or involuntary discharges of either the urine or fæces soon occasion gangrenous sores of the sacrum, or adjoining parts, in this class of patients. Care is also requisite to preserve them from falls, and from injury from fire.

447. *b. The complication of insanity with epilepsy or convulsions* (§ 174) does not admit of any precise mode of treatment. The means should vary remarkably, or even be opposite, according to the form of the mental disorder, and to the evidence furnished by particular cases of the existence of general or local fulness of blood, or of increased action, or of organic lesion of the brain. When the convulsive paroxysm occurs *in the course of mania or monomania*, or is in any other way associated with either, general or local plethora, or increased vascular action, or even both, is generally present, and requires sanguineous depletions, the cold affusion or douche, derivatives, cathartics, low diet, and permanent revulsants, or counter-irritants. The principles of treatment stated in the article Epilepsy, and those advised for *mania* (§ 432, *et seq.*), are usually appropriate in these cases: the application of the means to individual instances must depend upon the discrimination and judgment of the physician. When the paroxysm is connected with *dementia*, or *imbecility*, or *melancholia*, an irregular distribution or congestion of blood, or organic lesion of the brain or of its membranes, or even a deficiency of blood, may exist, and require the internal and external means already recommended for dementia (§ 444), with many of those prescribed for the cerebral from of Epilepsy (§ 61, *et seq.*).

448. *c. Apoplectic seizures* occurring in any form of insanity should be treated according to pathological principles. If they take place early in *mania*, or in its acute state, general or local depletions, or both, and the other means already advised in *apoplexy*, as well as in acute mania, are generally requisite. But when seizures of this kind, or resembling it, appear in the course of *dementia* or *fatuity*, a want of vital power in the brain, with or without local or general deficiency of blood, or inanition, and, in some instances, with some degree of congestion, is most probable, and sanguineous depletions are then injurious; advantage being often derived from restoratives, when these can be administered, from blisters on the scalp, and from enemata containing asafœtida, camphor, &c. The *coma* or *lethargy*, and the *vertigo*, often associated with incoherency and imbecility, require the same principles of treatment as now advised, in conjunction with the means recommended for dementia and fatuity.

449. *d. The other complications of insanity* (§ 181, *et seq.*) require but little remark. When the associated visceral disease is of such a kind as to perpetuate the mental disorder, especially when the *digestive* and *reproductive organs* are deranged, the removal of such disease becomes an important indication of cure requiring instant adoption; but the means which should be adopted for its removal must vary, or even be different, in different cases. No general principle can be stated that can apply to all. The secretions and excretions, however, should be promoted; and the processes of assimilation and defæcation—of supply and waste—duly regulated, according to the wants of the economy and the physical exertions of the patient.

450. iii. Of the Remedies used in the Treatment of Insanity.—My remarks on this head will be as brief as compatible with the due consideration of some points respecting which the opinions of the most experienced writers on insanity are greatly at variance, and which could not be so appropriately discussed as in this place. And, at the same time that I thus consider the different or opposite views entertained as to the efficacy of certain remedies, I shall also notice other medicines, which have been employed in some states of mental disorder, but to which I have yet either not sufficiently, or not at all, directed attention.

451. *A. Bleeding.—a.* Great difference of opinion exists as to the propriety of *general blood-letting* in insanity. Dr. Cullen advised it in the early stage, especially where there are fulness and frequency of pulse, and marks of increased impetus in the vessels of the head; but he admitted that, when the disease has subsisted for some time, he has seldom found it of service. Dr. Rush carried this treatment farther than any other writer of eminence; and urged numerous arguments in support of it, some of which are deserving of attention. He advised large blood-lettings, in the standing or sitting posture, early in mania; and, if the patient bore the depletion without syncope, he directed from twenty to forty ounces of blood to be taken. He was of opinion that this evacuation ought to be carried farther in madness than in any other acute disease whatever; and recommended it to be followed by local depletions, by low diet and refrigerant medicines, by cold applied to the head, and by tepid or warm baths. Weber, Bruckmann, and J. Frank carried blood-letting nearly as far as Dr. Rush. Dr. Haslam is also favourable to a decided recourse to vascular depletion in madness, though he does not advise it nearly to the extent directed by Dr. Rush and Dr. J. Frank; and he

considers it equally beneficial in melancholia as in mania. He, however, judiciously limits it to recent cases and plethoric habits, and prefers cupping on the scalp to venæsection; the quantity of blood to be taken varying from eight to sixteen ounces, and the operation being repeated as circumstances may require.

452. On the other hand, Pinel considered the signs of vascular action in the head, and of determination of blood thither, as very deceptive; and that bleeding, even in maniacal cases, accompanied by symptoms supposed to indicate plethora and determination to the head, tends to retard recovery, and to render it more doubtful, and to cause mania to degenerate into dementia. M. Esquirol coincides with Pinel in believing madness to be sometimes changed for the worse by bleeding. He has seen it increased even after an abundant flow of the catamenia; and has observed melancholia pass into furious mania after venæsection. He, however, approves of moderate blood-letting in plethoric cases, and when some accustomed sanguineous evacuation has been suppressed. Dr. Burrows has stated that, following example rather than experience, he tried blood-letting for several years; but discovering his error, he became more cautious, and ordered venæsection scarcely in six cases of simple mania or melancholia in as many years; and that, since he changed his practice, more patients have recovered, and the cases have been less tedious and intractable. Nevertheless, Dr. Burrows, as well as others who condemn general blood-letting even in mania or melancholia, is favourable to local bleedings, which, he believes, can seldom be dispensed with in recent cases. M. Guislain observes, that most of the cases admitted in the institutions for the insane in Belgium have been treated by blood-letting before their admission; but that, with few exceptions, the disorder has been aggravated by the practice. He, however, admits the propriety of this measure in the circumstances in which I have advised it in the foregoing section. Dr. Seymour states, as the results of his inquiries of Messrs. Beverley and Philips, the medical attendants in the Asylum on Bethnal Green, which receives about 400 patients, that the number of those admitted with vascular excitement, requiring blood-letting, are very few indeed; and that the lancet is very seldom used in cases of excitement, if there be no evident effect upon the brain from increased arterial action, so as to induce the fear of approaching apoplexy or paralysis. The reason they assign for not resorting to blood-letting is, that, having done so in several instances, the result was very unfavourable. The patients were reduced from the loss of blood, and the excitement was not abated; the tongue became typhoid, and the patient sank into a state of collapse, and died. Dr. F. Willis also condemns both general and local depletions; and Dr. Prichard states, on the authority of Mr. Hitch, that Dr. Shute has proscribed the use of the lancet, leeches, cupping-glasses, blisters, drastic purgatives, and the practice of shaving the head, at the Gloucester Lunatic Asylum; and yet, that the proportion of recoveries in this hospital is very large, and that no cases of sudden apoplexy or hemiplegia have happened. Before this practice, however, can be correctly estimated in respect of the treatment of insanity generally, the circumstances connected with the cases for which it was employed should be detailed; and it should be remembered, that a very large proportion of cases sent to lunatic asylums has undergone a more or less active treatment before their admission into these institutions.

[Dr. Conolly, who has had great experience in the treatment of the insane, remarks (*Lectures in Lond. Lancet*, Jan., 1846, Am. ed., p. 10), that in certain cases in which the patient is of a vigorous constitution, and a first attack of insanity has come on suddenly, like a sudden delirium, and is not the consequence of intemperance, he has no doubt that a single bleeding, with the administration of an aperient, followed by a few doses of antimonial medicine, will effect a speedy cure; but that this is not a frequent form of attack. It may also be allowed, where there is danger of death from apoplexy, and where there is great vascularity of the face and scalp; as a general rule, however, as already remarked, bleeding from the arm is rarely applicable to the treatment of any form of insanity, except in its very earliest stages.]

453. *b. Local blood-lettings* have been more generally adopted in the treatment of insanity than venæsection; and they admit of less marked difference of opinion as to the propriety of resorting to them, many of those who object to the latter adopting the former. Nevertheless, even local depletions require caution, and are most appropriate in recent cases of mania and of melancholia. The latter form of disorder requires this mode of depletion almost as frequently as mania, although not generally to the same extent. The situation of local bleeding is often of importance; and I believe that the occiput, or the spaces behind both ears, and the nape of the neck, should be preferred. The circumstances indicating the amount of depletion, and the frequency of its repetition, are the same as those which show the propriety of the practice on its first adoption. The discrimination and judgment of the physician must guide him in these particulars; but the presence or absence of certain symptoms, about to be noticed (§ 460), will generally guide his decision.

[Some of the highest authorities at the present day, although opposed to general blood-letting, recommend local depletion as highly useful and necessary. Dr. Conolly states that he has found leeches extremely serviceable at Hanwell, relief being almost always obtained by applying from 12 to 24 to the forehead, where pain is generally complained of, and sometimes behind the ears or neck. He also remarks, that he has never known such application productive of mischief; and that it may be repeated in a few days, and occasionally afterward, with almost invariable benefit. When pain and heat of the head are present, or recur after the first or second application of leeches, this writer recommends a blister to the back of the neck. If the excitement continues, he advises the head to be shaved, and the *ung. tart. ant.* to be rubbed upon the scalp night and morning, until pustules make their appearance.—(*Loc. cit.*)]

454. *c. As to vascular depletions*, however practised, no general rules can be assigned. Each case of insanity presents a distinct subject of study as to this practice; and a correct judg-

ment can be formed only after taking into consideration a number of circumstances connected with the age, previous health, nutrition, and occupations of the patient, with the causes of the malady, and with the states of vascular action and vital power. Among the more recent writers on insanity, M. Foville, M. Esquirol, and Dr. Prichard have formed the most correct views as to the propriety of vascular depletions in this malady. According to my limited experience, however, the first and last of these writers may be considered as somewhat too partial to the practice, while M. Esquirol may be viewed as placing rather too little dependance upon it. Estimates formed respecting it, from the results obtained in public institutions, cannot always be depended upon, unless all the circumstances were known connected with the great majority of patients admitted into them—with the particular classes of patients that they commonly receive; for, in some public, or even private asylums, many patients are admitted who have not received benefit from vascular depletion, or for whom it has been injudiciously employed; while those for whom it has been properly prescribed, as to quantity or repetition, and who have recovered after recourse had been had to it, require not the aid of those institutions. Besides, of the numbers sent to asylums, there are comparatively few cases which are strictly recent, or in which the period of deriving benefit from vascular depletion is not already passed; and it should also be recollected, that by far the greatest number of those who are admitted into public institutions for the insane have become deranged from those predisposing and exciting causes which exhaust physical as well as mental power, and that they are precisely the class of subjects least able to bear evacuations, or other depressing means of cure.

455. The lesions found in dissections of chronic cases, by MM. Bayle, Calmeil, Foville, and others, show that they are incompatible with the due exercise of an organ so delicate as the brain, and with the healthy manifestation of the mental powers; and, whether mental exertion or emotion disorder the circulation of this organ, and, consecutively, the material fabric, the integrity of which is necessary to the due performance of the mental operations; or whether the circulation, or the structure of the organ, is the first to be affected, and the mind the last to suffer, still such means as reason suggests and experience has shown to be most efficacious for quieting excited and disordered vascular action, generally and locally, without materially depressing or exhausting vital power, cannot safely be always, or even generally dispensed with.

456. M. Foville states that, during many years of extensive practice in one of the largest lunatic institutions in France, he has had recourse to evacuations of blood, general or local, abundant or in moderation, rare or frequent, according to the strength of the patient, the state of the pulse, the redness of the eyes, the heat of the head, and the agitation and want of sleep, in the greater number of cases of recent insanity which have been placed under his care. He has preferred general bleeding, where there existed general plethora; but, in opposite circumstances, he has found leeches on the neck, the temples, or behind the ears, or cupping upon the same parts, or on the shaved scalp, to produce decided benefit. He considers local bleeding so very serviceable, as to prescribe it in addition to general bleeding, when the symptoms imperiously demand this latter evacuation, yet he never rests exclusively upon the efficacy of vascular depletion, but has recourse to other means. He adds, that he has had many cases of intermittent madness, the attacks of which had lasted three or four months, or even longer, when left to nature; but that there was not a single attack of a month's duration since they were treated by blood-letting, and by warm baths, with cold applications to the head at the same time; and that the symptoms were often dissipated in five or six days by these means. The experience and views of Dr. Prichard as to this point entirely agree with those of M. Foville. Indeed, the practice was advocated by him (*Treat. on Dis. of the Nervous System*, ch. i., Lond., 1822) long before the treatise of M. Foville appeared. In estimating, however, the opinions of physicians attached to public institutions for the insane, as to the propriety or extent of vascular depletions, the sphere of their practice should not be altogether unheeded, and especially the circumstance of the patients having been treated previously to their admission, and the duration even of those which have been called recent cases. It is very obvious, that a patient who has been ill only three or four days, but during that time has been very actively treated, will not bear evacuating means on admission into an asylum; while another case, that would have been benefited by vascular depletions in the first few days of the malady, may be injured by them after a week or a fortnight had elapsed; and this, and even other cases of much longer duration, are usually considered as recent. After all that can be advanced on this point, the propriety of prescribing sanguineous depletions, to whatever extent, must depend upon the pathological knowledge and discrimination of the physician; and if he possess not these qualifications in a high degree—and unless he study and practise his profession as a whole, and as a profound and comprehensive science, and not as a trade or mechanical art, divisible into a number of separate parts, he cannot truly possess them—he is quite incapable of rationally and judiciously treating insanity, or any other class of maladies.

457. *d.* There are numerous circumstances which should be duly considered before sanguineous depletions are prescribed for insanity. The predisposing and exciting causes, and the various concurring influences, should be ascertained and kept in view; the age, habit of body, constitution, and occupations of the patient must be taken into account; and the duration of the distemper, and the means which have been already employed, ought to be precisely known. Next, the exact pathological conditions of the patient should be inquired into, and made the principal basis of the indications of the physical and medical treatment. If the patient be young, plethoric, or strong; if the attack has been acute and sudden; if the carotids and temporal arteries pulsate strongly; if the surface, and especially that of the head, be hot; if the face be red, or the conjunctiva injected,

and the pupil contracted; if intolerance of light or of noise, want of sleep, spectral appearances, disordered sensation, and much agitation be present, the abstraction from the arm of twelve, fifteen, or eighteen ounces of blood will generally be productive of benefit, if it be practised within the first few days of the attack. If the good effect be only temporary, cupping upon the nape, or on the occiput, or behind the ears, will generally be requisite, and should be preferred to a repetition of venæsection.

458. The suppression of evacuations and of eruptions indicates, as M. Esquirol insists, the propriety of vascular depletion; and this is the case generally; but care should be taken in prescribing it, even in such circumstances, if the foregoing indications of its propriety are not present in some degree or number. The suppression is an important reason for having recourse to blood-letting, but it should not be the only reason by which the physician is guided in the matter. The mode or situation of local depletion, in such cases, should have reference to the evacuation which has been suppressed. If the catamenia or the hæmorrhoids have disappeared previously to the attack, leeches may be applied to the highest parts of the insides of the thighs, or around the anus. Acute mania most frequently requires vascular depletion; and next, melancholia. For the latter, venæsection is seldom necessary, cupping behind the ears, or on the occiput, or on the nape, being preferable. The practice is sometimes also requisite in some other states of partial insanity, particularly after the disappearance of an accustomed discharge or eruption. Whenever melancholia or any other form of partial insanity is attended by headache, or by a feeling of oppression or of weight in the head, by a full state of the blood-vessels, and by constipation, blood-letting is necessary. In the more doubtful cases, the application of leeches, or cupping behind the ears, so as to abstract six, eight, or ten ounces of blood, or even a smaller quantity, in persons of a weak constitution, is generally beneficial. The earlier in the attack that depletion can be resorted to, the more certain and permanent will be the benefit to be derived from it; and even when an attack is threatened or impending, it should be had recourse to, if the circumstances and symptoms indicating the propriety of it (§ 457) are more or less manifest.

459. *c.* The *repetition* of vascular depletion should be guided by the same indications as point out the propriety of it in the first instance; when these continue or return, local depletion especially may be safely prescribed a second, or even third time, varying, however, the quantity with existing symptoms, and with the effects produced by the previous evacuation, and with those observed at the time. The absence of redness or flushing of the face, or even pallor of the countenance, may not be a reason against depletion, especially if the other indications of the propriety of it are present. When blood-letting in any mode is indicated, it should be performed in a standing, or sitting, or reclining position; and on the first sign of an effect having been produced in the pulse by it, or of faintness, the abstraction of blood should cease.

460. *f.* It is of great importance to attend to all the *circumstances and symptoms indicating the impropriety of vascular depletion* in the treatment of this class of disorders; these are, chiefly, far advanced age, debility, exhaustion of the vital power, and the puerperal states; the operation of those predisposing and exciting causes which depress or exhaust the vital energies, the physical functions, and mental faculties; continued addiction to the vice of masturbation, or to the inordinate use of spirituous liquors, or to narcotics; insufficient nutrition previously to the attack; all indications of weakness and irritability, without power or tone; and all approximations to the state characteristic of delirium tremens, as a pale or collapsed countenance; very quick, tremulous or small, irregular, soft pulse; copious perspirations; a terrified, fearful, and agitated state of mind; insensibility of external impressions, and tremors of the extremities. Wherever the tongue is tremulous, or the voice weak or tremulous, the hands unsteady, the pulse weak, quick, or open, and readily compressed; or when the extremities and skin are cold, damp, or clammy; or the sweats profuse, and the tongue is covered with a dark, brown, mucous coating—however great the maniacal or delirious excitement and agitation may be—sanguineous depletion will then be injurious. A natural temperature, or coolness of the scalp; weak action of the carotids, and great frequency of the pulse, with swimmings or giddiness on assuming the standing or sitting position, are also strong indications of the impropriety of blood-letting.

461. *B. The abstraction of heat from the head, bathing*, &c.—The hair should be removed from the head in all acute cases; and where there are great heat of the scalp, and vascular excitement, particularly in mania, the head ought to be shaved.—*a.* For young, robust, and maniacal patients, the *shower bath*, twice or thrice a day, or the *affusion of cold water* on the head, is of the greatest benefit, and is recommended by Celsus, Rush, Esquirol, Burrows, Foville, Prichard, and many others. When hysterical symptoms are associated with insanity, the affusion of cold water on the head is especially beneficial. Both the cold shower bath and the cold affusion are sometimes followed by reaction, and consequent excitement and violence, particularly in irritable temperaments. In these cases, a repetition of the treatment, and the continued application of cold to the head, by means of evaporating lotions, or the *ice-cap*, will generally be necessary. M. Foville places a cap on the head containing ice, and keeps the body immersed in a warm bath for two or three hours, and repeats this practice twice or thrice in the day, according to the violence of the symptoms. At first he found, when resorting to it only once a day, that reaction, with increased agitation, not infrequently supervened; but, on repeating the bath, and keeping the ice constantly applied to the head, the success of the treatment has been much greater. This combination of warm and tepid bathing, with cold applications of various kinds to the head, was, however, long previously advised by Daniel and Folberg.

462. The foregoing modes of abstracting heat from the head, as well as the application

of evaporating lotions, are serviceable chiefly in *recent cases*, where there are much heat of the scalp and irritability; but they should be discontinued when the temperature is reduced to the natural standard, and repeated as soon as it rises above it. Intense cold applied to the head, in chronic states of insanity, although the patient be noisy and violent, seldom induces sleep or quiescence: it may even become a source of irritation. The temperature of the scalp should be a guide to the practice in all cases. It may be stated as a general rule, that the heads of all insane persons should be kept cool, and the hair closely cut: they should never wear any covering on the head when within doors. The only exceptions to the rule are furnished by some cases of dementia, or partial insanity, where the low temperature of the head, and weak action of the carotids, indicate insufficient vascular action and tone in the brain: in these cases, the hair may be worn longer than in others. Insane patients should also sleep with their heads more or less raised.

463. *b.* The *tepid douche*, or affusion, *tepid shower bath*, or even the *warm douche*, are severally of use in certain states of mental disorder, especially when there are great restlessness and want of sleep. In melancholia, I have found the tepid shower bath, commencing with the water at 90°, and gradually lowering the temperature to 80°, and ultimately to 60° or 50°, of great benefit. The *warm douche*, or *affusion*, is most appropriate to delicate females, or to persons of great susceptibility and irritability, conjoined with weak action and deficient vital power, and particularly when there is prolonged watchfulness. *Warm* and *tepid bathing* are extremely serviceable in most cases of insanity, when judiciously managed and conjoined with other appropriate means. If there be great vascular action generally, as well as locally, as in recent maniacal cases, tepid bathing will then be appropriate. If the lower extremities are cold, and the general surface is either of the natural temperature, or below it, warm bathing is particularly indicated. If there are chronic eruptions on the skin, a languid circulation, sleeplessness, and irritability, the warm bath continued for a considerable time, and frequently repeated, is especially beneficial. In many cases, increased heat of the scalp exists in connexion with these states of the general surface and extremities; and for these, the addition of mustard or of salt, or both, to the warm water, while cold, in some form, if applied to the head, will be of great service, particularly in the more recent cases. The association of cold applications to the head, and of the *warm semicupium*, or *pediluvia*, either simple or medicated, is also useful, particularly when there are much restlessness and watchfulness. *Cold bathing*, especially salt-water bathing, is sometimes of service in chronic mania, and in melancholia; but chiefly during convalescence, and when tonics, change of air, and invigorating regimen are necessary. It has been advised by numerous writers, but it requires a careful consideration of various circumstances connected with each form of insanity, and with individual cases, before it should be carried into practice. The *bath of surprise*, or suddenly plunging the patient into a cold bath, and keeping him immersed in it for some time, or until incipient asphyxia is produced, although recommended by Baglivi and Boerhaave, is not only an empirical, but also a dangerous practice. It has been said to have cured many, that is, many have recovered *after* having had recourse to it; a few, probably, almost immediately; but others have experienced attacks of apoplexy, or of epilepsy, or even of palsy, in consequence of it. The cold shower bath is certainly the safest and most generally applicable mode of cold bathing for any form of mental disorder, the temperature, as well as the quantity of water, being varied according to the circumstances of the case.

464. *C. Emetics* have been recommended by many writers in this class of disorders, and especially by Monro, Perfect, Selig, Ranoe, J. Frank, Rush, Cox, Esquirol, and Prichard. They are more particularly indicated in melancholia. Dr. Burrows has had recourse to them, chiefly to free the stomach from troublesome ingesta, accumulated phlegm, or morbid bile, and sometimes to give activity to torpid viscera. He has found them useful, also, by interrupting intense abstractions, hallucinations, and capricious resolutions, and when urine has been retained from obstinacy. They are, however, still more beneficial by emulging the biliary organs, by evacuating mucous sordes from the stomach, and by rousing the organic and assimilating functions. Dr. Cox states, that in every species and degree of maniacal disease emetics have proved valuable and efficacious; and Dr. Prichard adds, that Dr. Wake, physician to the York Lunatic Asylum, has assured him that he has found no remedies so frequently efficacious as emetics. Dr. Haslam, however, although he confirms their utility in cases attended by disorder of the stomach, declares that, after the administration of many thousand emetics to persons who were insane, but otherwise in good health, he never saw any benefit derived from them. The experience of Esquirol, Foville, and Prichard respecting them agrees with my own observation; they are precluded by a plethoric habit and cerebral congestion, at least until these are removed. They are most likely to be of service in hypochondriacal dejection and melancholia, attended by torpor, and when the secreting functions and vital actions require to be stimulated and roused. They are also sometimes useful during states of furious excitement, producing a calmness and restoration of sleep. Where there is a morbid addiction to intoxicating liquors, or a ravenous appetite in maniacal cases, tartar emetic, added to these liquors, or to the food, so as to produce either nausea or vomiting, is often of service. When there is much determination of blood to the head, and in other circumstances connected with insanity, vomiting is frequently excited by tartar emetic, or even by other substances, with great difficulty. In these cases, the *cold affusion* on the head, soon after the emetic has been taken, will often cause its operation, as well as protect the brain from the ill consequences of its operation. A combination of emetics is also of use in these respects.

465. *D. Purgatives.—a.* The propriety of exhibiting cathartics or purgatives in the treatment of mental disorders is undoubted; but there are various circumstances, complications, and states of these disorders which contra-in-

dicate their use. There can be no hesitation in prohibiting them when there is any indication of inflammatory action in the digestive mucous surface. This surface is often inordinately irritated, or even ulcerated in the more chronic states of insanity, and especially in dementia, imbecility, and fatuity; and where such is the case, purgatives are generally injurious. In other circumstances, purgative medicines, judiciously selected, combined, and managed, are among the most important means which can be prescribed in mental derangement. The chief difficulties are the selection and combination of them appropriately to the circumstances of individual cases; and in the ability of overcoming these difficulties the science, ability, and success of the physician consist. Dr. Prichard remarks, that "the mildest cathartics are preferable to others in most instances, because their use can be long continued without injury to the structures on which they immediately act;" and that "the neutral salts, infusion of senna, rhubarb, jalap, castor oil, are, in the majority of cases, sufficiently powerful, and may be used daily or frequently, according to circumstances." More active purgatives than these are, however, often necessary in the early and acute stage of insanity, and especially in melancholia, mania, and some states of partial insanity. In these, particularly, the intestinal and biliary secretions are frequently viscid and morbid, and the cells of the colon and cæcum are loaded with these and other fæcal matters. Hence a continued use of the more attenuating and solvent purgatives, and an occasional, or even frequent, recourse to the more active cathartics, aided by cathartic enemata, are necessary to the obtaining of the effects which these medicines are capable of producing on the mental disorder. Montanus was correct when he said that half purges tire and molest the body without being of much service; and hence the partiality of the ancients for the more drastic purgatives, as well as many of the older physicians among the moderns, in the more acute forms of insanity. Willis gave a scruple each of calomel and extract of black hellebore, with six grains of extract of jalap, in melancholia; and, although the quantities may appear great, yet it should be remembered that calomel in this dose will produce a solvent rather than a purgative effect, and that much of the virtues of extracts were dissipated by the mode of preparation in those days.

466. *b.* That the virtues ascribed to *hellebore* by the ancients, in mania and melancholia, were not greatly overrated, may be inferred from the confidence reposed in it down almost to the present time, and still confided in through Germany. Celsus gave the black hellebore in melancholia, and the white in mania; Aretæus preferred the former, and Mayerne the latter. Both species are employed on the continent, but the black is more frequently used. Berends, Greding, Hufeland, Ploucquet, &c., prefer it to the other purgatives, and Quarin prescribes it in the form of Bacher's pills (F. 156). Dr. Burrows, however, states that he has tried the extract of both the black and the white species, and found their operation very uncertain, and their effects, both upon the mental disorder and upon the excretions, in no way different from other purgatives or emetics. The extract of the *Gratiola officinalis* was much praised by Fischer, Lentin, Hufeland, and Schmidtmann, *aloes* by Aretæus and many others, and *jalap* by Rademacher.

467. *c.* In the acute and early stages of the disease, with manifest congestion or determination of blood to the brain, I have preferred full doses of calomel with extract of colocynth and scammony, or with the compound camboge pill, given late at night, and followed in the morning occasionally by about four, five, or six drachms each of castor oil and spirits of turpentine, taken on the surface of milk, or of some aromatic water. If these do not operate copiously, an *enema*, containing about double the quantity of the oils, should be administered in the course of the day. I have found these oils the most efficacious purgatives, particularly as respects their operation on the mental disorder, in the early stages of mania. In some cases it will be serviceable to trust to the more common purgative pills, with the addition of a little croton oil to sharpen their action. After a time the calomel may be omitted, but during the acute state of disease, purgatives should be continued until the appearance of the tongue and of the evacuations improve. In many cases, especially those attended by much vascular excitement, the addition of tartarized antimony, or of ipecacuanha, to the purgative, will greatly promote its operation and keep down vascular action. When it is desirable to produce both an emetic and a purgative operation, as in several states of mania, a solution of Epsom salts, or of sulphate of soda, to which tartar emetic has been added, may be taken every hour or half hour until the effect ensues. It may afterward be continued at longer intervals, so as to act freely on the bowels.

468. *d.* In the more chronic states of insanity, and especially when there is much irritability or want of power, or when the tongue continues loaded and furred, but moist, notwithstanding the frequent exhibition of purgatives, tonics should be conjoined with them, and the constitutional powers ought to be supported by suitable diet and restorative medicines. In these circumstances, the compound infusions of gentian and of senna, with sulphate of potash, or sulphate of magnesia, or with tartrate of potash, and an aromatic tincture (F. 266), or the extract of aloes with sulphate of quinine and camphor (§ 441), will generally prove not only efficacious in their action on the bowels, but also beneficial as respects the mental disorder.

469. *e.* In respect of *purgatives*, as well as of *bleeding*, it may be observed, that when insanity proceeds from *moral* and *depressing causes*, they are not generally beneficial unless conjoined with tonics, and that frequent doses of calomel in such circumstances are often injurious. Purgatives, however, of a *stomachic* kind, or a combination of them with *restorative* medicines, are requisite in order to promote the secretions and excretions.

[Purgative medicines are too inconsiderately given in cases of insanity, in some of which they are not at all required, or are actually hurtful. It is an error to suppose that obstinate costiveness is a common accompaniment of acute mania, and of other forms of insanity. In cases of hysterical insanity, and in melan-

cholia, it is excessive and sometimes incredible; but in other forms of insanity the bowels are not unfrequently irritable, the patient is readily disordered by particular articles of diet, and much depressed by rough purgatives, without mental benefit. If the bowels require attention, any of the ordinary purgative medicines may be given, and those are the best which the patient has the least objection to take. The nervous irritability occasioned in many constitutions by the frequent use of any mercurial medicines, suggests caution with respect to their continued employment; but in many cases the combination of a small quantity of *blue pill*, or *calomel* with *rhubarb*, or *colocynth*, or *aloes*, is often less disagreeable to the patient than any other form of medicine. There are many forms of mental disorder in which the *pulvis jalapæ compositæ* is particularly serviceable: forms in which there is a determination of blood to the head, or a general tendency to plethora, seem to be especially benefited by this simple medicine, taken in doses of a scruple or half a drachm every morning. In cases in which there is an obstinate resistance to medicine, the best plan is to apply one or two drops of croton oil to the tongue by means of a quill, or it may be given in beer.—(Conolly.)]

470. *E. Mercury.*—Mercurials may be employed for mental disorders with three intentions: 1st, to evacuate biliary and fæcal accumulations; 2d, to improve the secretions, particularly that of the liver; and, 3d, to produce a copious flow of saliva. To fulfil the *first* of these intentions, calomel is extremely useful, particularly in melancholia and in mania; but it should be conjoined with, or followed by, other purgatives. To produce the *second* effect, any of the mercurial preparations may be employed, either alone or with emetic tartar, digitalis, camphor, narcotics, &c. To accomplish the *third* end, calomel, blue pill, or the bichloride of mercury, may be given in any of the foregoing combinations, or alone. Mercury may also be exhibited in such a manner as to produce both a tonic and an alterative effect. With this view, small doses of the bichloride may be given in a tonic tincture or infusion, or small doses of Plummer's, or the blue pill, may be taken on alternate nights. The employment of mercurials to an extent likely to produce salivation, or with this intention, is of very doubtful propriety, but was recommended with this view by Willis, Rolfinck, Perfect, Smith, and others. Mercurial salivation was much praised by Rush. Dr. Prichard remarks that it is by no means a general remedy for maniacal diseases, but in cases of torpor, with suppression, or a very scanty state of any of the secretions, it is frequently advantageous. He adds that mercury should be used in mild alterative doses, and discontinued as soon as the gums become slightly affected. Dr. Burrows mentions two chronic cases of melancholic insanity in which the occurrence of salivation produced a cure. In mania, this effect is occasioned by mercury with greater difficulty than in melancholia. This writer states that he, subsequently to these cases, made many attempts to cure insanity by mercurial salivation, and that, although ptyalism was accomplished in several, yet he never succeeded but in one case to restore the mental functions; and this also was one of melancholia. Several instances of cure effected by salivation have been recorded by authors; still, I believe that mercury, exhibited to the extent necessary to produce this effect, and especially when it fails of causing it, is quite as likely to be as injurious as beneficial—to cause partial insanity, melancholia, and mania, to lapse into dementia or imbecility, particularly in weak, susceptible, and irritable constitutions. We know, from numerous cases (and several have been observed by me), that the injudicious or excessive use of mercurials will sometimes occasion partial and melancholic insanity, a circumstance which should, in some manner, influence our practice. Unfortunately, we know nothing of the symptoms or of the modifications of insanity which indicate a probable advantage from mercurial salivation. The most likely conditions are mania, or melancholia consequent upon apoplexy, or complicated with hepatic disease. Mercurials, and particularly salivation, are most likely to prove injurious in every form of insanity which has been occasioned by depressing moral, or by exhausting physical causes, and especially by prolonged anxiety or by masturbation. The bichloride of mercury, however, used in minute doses, as an alterative, in conjunction with tonics, is sometimes of service in several forms of mental disorder, and particularly in scrofulous constitutions.

471. *F. Soporifics.—a. Sleep*, &c.—It has been supposed that it is indispensable to procure sleep, particularly when watchfulness is protracted, and that relief will generally follow it when obtained; but sleep is not always much required, and is not even generally followed by relief, although it frequently is. In the early, or even incipient states of mental disorder, topical bleeding, shaving the head, cold applied to the scalp, and purgatives, are the best means of producing repose; and others, especially narcotics, are then generally injurious; but in more chronic cases, and where there is obvious exhaustion, consequent upon depletion and evacuations; or a state of great susceptibility and irritability, or of vascular inanition generally, or locally as respects the brain, appropriate means of procuring sleep, and the use of narcotics in suitable combinations, are most requisite. Various modes of producing a soporific effect in mental disorders have been advised, and very often with little attention to the pathological conditions for which they are severally suited. A few of these have been just mentioned; and others, especially refrigeration of the scalp, swinging, gyration, diet, certain positions of the patient's head, narcotics, &c., have been also recommended, with a view to this effect. It is often more beneficial to procure repose by other and more indirect means, than by narcotics; but several of these may be more dangerous than the latter, if empirically prescribed, as they too frequently have been.

472. *Swinging* seems to have been used by Celsus and Cælius Aurelianus to procure sleep; and its influence, in a limited form, is shown, by the rocking of a cradle, on children, and by the motion of a boat or vessel at sea, upon both children and adults. It obviously affects the circulation, especially that of the brain, and, indirectly, both the stomach and

the cutaneous circulation. *Horizontal gyration* was advised by Darwin, and both it and *swinging* were practised by Dr. Cox in mental disorders. Dr. Hallaran, also, adopted both these means in the Cork Lunatic Asylum, and coincided with Dr. Cox as to their utility. They employed two machines, or, rather, modifications of the rotatory machine; one in which the patient was kept in a sitting position; the other in which he was placed horizontally in a bed or crib. The former, or the *erect* machine, is described as seldom failing to produce copious evacuations in the most obstinate cases, especially if, on increasing its velocity, the motion be suddenly reversed every six or eight minutes, pausing occasionally, and stopping its circulation suddenly. The effects are, an instant discharge of the contents of the stomach, bowels, and bladder in quick succession. Should the stomach only be acted upon, a purge is recommended immediately afterward. The *horizontal* modification of this machine, or circular bed, is employed for procuring sleep; the *erect*, for producing evacuations and moral repression. At *La Charité*, in Berlin, machines for both horizontal and perpendicular rotation were employed. Von Hirsch recommended swinging in a hammock; and various other modifications of this method have been advised.

473. Dr. Burrows remarks, respecting these powerful means of treatment, that clear evacuation of the bowels should precede the use of either, and that they should not be employed early in the disease until the violence of the attack has subsided, nor in young, plethoric persons, nor where there is vascular determination to the head. The motions ought to be commenced gradually, till carried to the degree of velocity desired. When sleep is the object, a slow and continued action of the machine, without affecting the stomach, if possible, is necessary. When its full motion produces great prostration of strength, and lowers remarkably the circulation and animal temperature, advantage has been obtained from it. In the intermitting form of mania, it has sometimes checked the approaching paroxysm; and in the more continued cases, it has broken the catenation of morbid ideas; and the dread of being again placed upon it has often made the patient more manageable and alive to surrounding objects. Dr. Prichard states, that Dr. Bompas and Dr. Drake, of the Lunatic Asylum at York, have assured him that they consider the rotatory machine as a resource of great value in the treatment of madness. Although the opinions of these physicians, as well as of Dr. Cox, Dr. Hallaran, and some others, are in favour of the use of this machine in the treatment of insanity, yet it requires so much caution, and pathological observation and experience, to avoid the most dangerous consequences* from it, as to deserve the opinion already expressed respecting it (§ 440).

474. Want of sleep, in some chronic cases of insanity, sometimes arises from inanition, consequent upon too low diet and the abuse of evacuating and lowering remedies. In these, as well as in those cases of recent mania occurring in delicate and nervous constitutions, and arising from a deficiency of blood generally, and possibly, also, locally in regard of the brain, a full diet, and malt liquor or wine in moderation, will prove the most serviceable soporifics. Tuke, Burrows, and others have remarked, that noisy maniacs, who hardly ever sleep, by a change from a low to a full diet, especially after a full meal before going to bed, with the addition of a moderate quantity of porter, or even with porter alone, have often slept soundly, and ultimately recovered. It has been recommended to procure sleep by causing the patient to sleep with the head low; but this is a dangerous experiment, especially where there is vascular determination to the brain, and in such cases is sure not to succeed. Indeed, sleep in the entirely recumbent position is seldom attended by benefit to maniacs. When, therefore, they can be persuaded to sleep in a semi-recumbent position, it is to be preferred. The sitting position is generally better than the entirely horizontal; but, whatever may be the position, sleep will not afford relief if the head be not kept cool by sufficiently refrigerating applications. The hop-pillow is sometimes of service, in the more nervous and irritable cases; but it is rarely of use when there is active vascular determination to the brain—at least, not until this morbid state is removed. When much disorder of the stomach exists, alkalies and other antacids often assist in procuring repose, espeeially when presented in conjunction with narcotics, and when the circumstances of the case warrant the use of these latter means. Very gentle friction of the head, prolonged combings of the hair, and gentle friction of the general surface, especially after a tepid or warm bath, have been followed by refreshing repose in many of the nervous states of mental disorder, or in cases unattended by marked vascular excitement in the brain.

475. *G. Narcotics.—a. Opium and its preparations* have been prescribed in mental disorders by Cox, Odier, Brandreth, Chiaruggi, Doemling, Riel, and many others, while a few writers reprobate the practice. There can be no doubt of opiates being of great service when appropriately employed. They are not generally admissible, and they therefore require great discrimination in prescribing them. I have already stated the pathological conditions and the previous treatment warranting a recourse to them in mania (§ 440); and the same remarks apply to the employment of them in melancholia. In this latter affection, however, as well as in the more purely nervous states of mania and monomania, or when these are complicated with hysteria, it is often necessary to conjoin opiates with some restorative or antispasmodic, as camphor, valerian, ammonia, æther, &c. Opiates are less frequently useful in any of the forms of dementia than in these. M. Guislain justly remarks, that in cases of high excitement, strong, full pulse, heat of skin, fulness of the vessels of the head, opium is injurious. It is most serviceable in delicate and attenuated persons of feeble constitution, and in those with cold, relaxed skin, and frequent, small, weak pulse. If the disease has been of some duration; if the circulation has been daily losing

* Dr. Horn, of Berlin, remarks, that this powerful remedy should never be employed without great caution, and by experienced persons. Dr. Burrows adds, that, notwithstanding his caution, a fatal accident occurred to one of his patients from its use, and created so great a popular clamour as to oblige him to retire from *La Charité*.

its force; if there are only nervous symptoms to combat, there can be no hesitation in giving opium. I may add, that it is especially indicated when restlessness, or prolonged want of sleep, has continued after sufficient evacuations have been procured; and still more so, if great exhaustion, tremor, cold perspirations, fits of violent delirium, and a very rapid and small pulse supervene.

476. Still, much of the benefit that may be derived from opium will depend upon the selection of the preparation, the dose, and the mode of combining and of exhibiting it. The *acetate* and *muriate of morphia* are not so likely to disorder the head subsequently as pure opium or the simple tincture; and Battley's solution, or the black drop, may be preferred to the latter. When, however, opium or its tincture is given with aromatics, consequent disorder is more rarely produced by it. Van Swieten, Darwin, Kriebel, Brandreth, Currie, and others record cases in which remarkably large quantities of opium have been given with advantage. But these are extreme cases, which merely show what may occur, but which should not guide our practice. It will generally be preferable, when the indications for the use of opium are conclusive, to prescribe it in a full dose at once, especially if the chief object be to procure sleep. In this case, from one and a half to three grains may be prescribed; or half a grain of the acetate or the muriate of morphia. If this dose fail, it may be repeated after six or eight hours; or even a somewhat larger dose may be taken. If a third dose produce no good result, it should be laid aside. In some cases, much smaller quantities may be prescribed with advantage, especially when debility, exhaustion, or inanition of the vascular system is great; but, in these circumstances, the opiate should be repeated somewhat more frequently, and be combined with aromatics, restoratives, antispasmodics, or tonics, according to circumstances. Dr. Burrows states, that where an anodyne has been required, he has begun with three grains of opium, and repeated one every two or three hours, never, in this way, exceeding twelve grains; and that if sleep has not then followed, he has desisted.

[It has been remarked by Dr. Conolly, that in cases where mania comes on with fever, and the patient is excessively feeble, and yet extremely restless and violent at the same time, the tongue being coated and brown, and scarcely any food being taken, all sedatives are useless, or worse than useless; and that, in every case of acute mania, it is important to avoid giving sedatives for a long time, or in frequently-repeated doses, as they either obscure the symptoms, or modify, without amending, the patient's condition. In private practice, he also states, that he has seen patients kept under the influence of *acetate of morphia* for many months without any good effect; and that opiates, if repeated in increased doses, after disappointing the first trials of the practitioner, may be followed by wilder and rapidly-increasing excitement.]

477. The *combination* of opiates with other remedies thus becomes a matter of no small importance; and, indeed, much of the benefit opiates afford depends upon this circumstance. Fribore advises them to be prescribed with camphor and nitre; and Perfect, in nearly a similar form. There can be no doubt of the advantage often derivable from this and similar modes of exhibiting them. Where there is much determination of blood to the head, however, the camphor, unless in very small doses, may be injurious. But, if restlessness and watchfulness arise chiefly from exhaustion, inanition, or morbid nervous susceptibility—if the disorder be chiefly or altogether nervous—be independent of increased vascular action in the brain—this and similar combinations, and especially those with the preparations of valerian, of æther, of ammonia, asafœtida, musk, various aromatics, &c., will be most advantageous. In more doubtful circumstances, the combination of opium with ipecacuanha, soap, and a little capsicum, has proved beneficial in my practice. When hepatic derangement is present, or when some degree of vascular excitement still remains in the brain, opiates, conjoined with calomel and James's powder, are sometimes of use; but they should, even in this combination, be prescribed with caution and discrimination.

478. The question as to the employment of opium or morphia in *enemata* and *endermically* is altogether subordinate to that respecting the circumstances in which this medicine is indicated. When these circumstances are clearly manifested, the usual mode of exhibition should be tried, at least at first, more especially as it admits of the combination of opiates with other remedies; but when there is great difficulty in administering them by the mouth, or when they fail of affording the desired benefit, although obviously indicated, then the acetate or muriate of morphia may be sprinkled on a blistered surface, from which the cuticle has been removed; or any of the preparations of opium may be prescribed in enemata. Owing, however, to the occasionally rapid absorption of fluids from the rectum and colon, a much smaller dose of opium should be exhibited in this than in the usual way. From ten to fifteen minims of the tincture may be administered every six hours. I have found the compound tincture of camphor and the sirup of poppies severally of use; from one to two drachms of the former, and from two to four drachms of the latter being thus employed, but at different times, or in separate cases. When the patient awakens from sleep procured by the use of opiates, in a state of increased excitement, their exhibition should be relinquished.

479. *b. Hyoscyamus* has an advantage over opium, in neither constipating nor stupefying the patient. In order to obtain decided soporific effects from the extract, a dose of from ten to fifteen grains should be given at bedtime, or from a drachm to a drachm and a half of the tincture. It is apt to produce dryness of the mouth and fauces, and heat or irritation in the stomach; but it calms the circulation, and allays nervous susceptibility and irritation. It is very serviceable in cases characterized by morbid sensibility and irritability, and is much praised by Fothergill, Willis, Stoerck, Selig, Meyer, and Hufeland. Dr. Prichard does not consider it to be a remedy of great importance; while Dr. Burrows views it in a much more favourable light. The opinion of the latter physician accords more with my own expe-

rience. It is often of great service when prescribed with camphor.

[Dr. Conolly gives the preference, in acute mania, to the preparations of *hyoscyamus*, especially the tincture, in doses of ʒij., or of the extract from 8 to 10 grains, and, whatever sedative is employed, he states that the dose should be large.]

480. *c. Belladonna* has been recommended in mania by Theussinck, Vogel, Buchoz, Ludwig, Remer, Schmalz, and Hufeland. J. Frank advises it in mania complicated with epilepsy; and Muller prefers the powdered root to the extract, and gives it in gradually increased doses until the pupil becomes dilated. It has been chiefly employed in the forms of extract and tincture in this country, and is favourably mentioned by Dr. Seymour and Dr. Burrows. Dr. Millingen states that he has found belladonna preferable to hyoscyamus or conium; and that the external employment of the extract, according to the endermic method, has been very effectual in reducing excitement, more especially when applied to the epigastric region. In the case of a female to whom I was very recently called in consultation, and for whom the indications (◊ 440, 475) for narcotics and restoratives were very manifest, the following pills were prescribed with great benefit:

No. 271. ℞ Extracti Belladonnæ gr. ij.; Camphoræ rasæ gr. xij.; Ammoniæ Carbon. gr. xij.; Pulv. Capsici gr. iij.; Pulv. Acaciæ et Balsami Peruviani q. s., ut fiant Pilulæ viij., quarum capiat duas, sextis horis.

481. *d. Stramonium* has been employed in mental disorders by Allioni, Maret, Stoerck, Remer, Reil, Greding, and Barton, chiefly in the form of extract and tincture. The vinous tincture of the seeds, made by infusing two ounces of the bruised seeds in eight ounces of Spanish wine, and one of alcohol, according to most of the German pharmacopœias, has been recommended by Schneider and Hufeland in doses of ten to twenty-five drops, twice or thrice daily. Dr. Burrows states that one grain of the extract of stramonium has procured several hours' sleep in furious mania, when other narcotics, in considerable doses, had not succeeded; but the patients were much more violent when they awoke. This result too frequently follows the use both of stramonium and of belladonna. The effects of these narcotics, when given in considerable doses, should be carefully watched, and distinguished from the more unfavourable symptoms observed in mania. When dryness of the throat, dilatation of the pupils, anxiety, vertigo, convulsive movements of the extremities, &c., appear, as well as when mental excitement is increased by them, the employment of them should no longer be persisted in. The extract and tincture of *aconite* have been prescribed by Durande and others; but it is a dangerous medicine in most forms of mental disorder. *Conium* is less useful than hyoscyamus, and hence unnecessary.

[The Indian hemp (*Cannabis sativa, hachisch*, &c.) has lately been employed in France, and to some extent in this country, in the treatment of insanity, and apparently with very beneficial effects.* Dr. Brigham, of the New-York State Lunatic Hospital, states that he has employed the pure extract of it, procured from Calcutta, in doses of from one to six grains, and that he regards it as a very energetic remedy. It had no particular effect in dementia; in melancholia it caused an exhilaration of spirits, sometimes causing intoxication; at others, nausea and sickness at the stomach. In some instances it produced headache, and some were rendered for a short time apparently insensible and cataleptic. On none had it any lasting effect, either good or bad. It would, however, appear to be a powerful remedy, and is well worthy of farther trials.—(*Am. Jour. of Insanity*, vol. xi., No. 3, p. 281). Dr. Conolly has also recently made trials of this article, and thinks it very useful in chronic cases, although its effects are uncertain. He recommends ʒiss. to ʒij. of the tincture of the plant grown in a tropical climate (tropical heat being necessary for the development of its medicinal properties) in cases of recurrent mania.]

482. *H. Sedatives.*—*a. Digitalis* has been praised as a remedy in mental disorders by Darwin, Ferriar, Currie, Fonzago, Jones, Muller, Guislain, Uwins, Burrows, Ellis, and others. Dr. Cox ranks it next to emetics, and thinks that its efficacy is attributable as much to the nausea it creates, when given in sufficient doses, as to its power over the circulation. Dr. Hallaran considers that, when it is given after the system is reduced by proper evacuations, and particularly by repeated purges of calomel, it is more to be trusted to than any other remedy. Besides its capability of restraining the heart's action, he supposes it to possess remarkable anodyne and soporific qualities in maniacal cases. He commences its use in doses of five or ten drops of the saturated tincture, thrice daily, and gradually increases the dose to fifty drops. Dr. Burrows remarks, that the propriety of lowering the system, by depletions and purgatives, before the exhibition of digitalis is begun, is confirmed by his own experience; and that he perfectly concurs with Dr. Hallaran in considering this medicine as having a very powerful influence in all the stages of insanity accompanied with great vascular excitement and a rapid pulse. Dr. Prichard observes, that the cases in which digitalis is most likely to be useful are those attended by great arterial action and high mental excitement. M. Foville considers that it is chiefly beneficial in those cases in which the mental affection is complicated with hypertrophy of the heart. I may remark, respecting this substance, that, when the large doses advised by Dr. Hallaran are given, the well-known effects of it should be carefully watched; and, as soon as they begin to appear, camphor, ammonia, æther, &c., should be had recourse to, and its use relinquished. Digitalis is useful, also, in other forms of the malady besides those particularized above—and even in the low states of derangement—when conjoined with camphor, ammonia, and other remedies. In these, as well as in other forms of the disorder, I have given it with great advantage in the following manner, after evacuations had been freely procured:

No. 272. ℞ Camphoræ rasæ gr. iij.—v.; Pulv. Digitalis gr. ij.; Extr. Hyoscyami gr. vij.; Mucilag. Acaciæ q. s. M. Fiant Pilulæ iij., horâ somni sumendæ.

No. 273. ℞ Camphoræ rasæ gr. ij.: tere cum Mucilag. Acaciæ ʒj.; Aquæ Menthæ virid. ℥j.; Spirit. Ætheris Sulph. Comp. ʒj.; Tinct. Digitalis ℥lx.—xx.; Tinct. Hyoscyami ʒss. M. Fiat Haustus, bis terve in die sumendus.—Vel.

* Du Hachisch et de Alienation Mentale Etudes Psychologiques, par J. Moreau (de Tours), Medicine del' Hospice, de Bicêtre, &c., 8vo, p. 431. Paris, 1845.

No. 274. ℞ Tinct. Digitalis ℥lx.—xx.; Tinct. Hyoscyami 3ss.; Spirit. Ammon. Arom. 3ss.; Liq. Ammoniæ Acetatis 3ij.; Mist. Camphoræ 5j.; Sirupi Aurantii 3ss. Fiat Haustus, ter in die sumendus.*

483. *b. Prussic acid and laurel water* have been recommended as sedatives in various forms of insanity. The latter was advised by Thilenius; the former by Dr. Seymour and Dr. Balmanno. Dr. Burrows states, that he made trial of prussic acid, but never derived permanent benefit from it in any one case.

484. *c. Tartar emetic*, in small and frequently repeated doses, in order to reduce vascular excitement in the brain, as well as in the system generally, was recommended by Willich, Muller, Bodel, Frize, Burserius, and Baldinger. A combination of it with tartrate of potass, so as to act also upon the bowels, was advised by Pideret, Fordyce, and Hufeland. Several writers have prescribed it so as to produce more or less continued nausea. Drs. Cox and De Vos, of Berlin, consider it of great service when vascular action is excited, and when the hæmorrhoidal or menstrual discharges have been suppressed, or the portal circulation obstructed. These are, indeed, the circumstances especially requiring it, whether existing in mania or monomania, and more especially in the sanguine or bilious temperament. Where there is more obvious vascular inanition or exhaustion, and in nervous and susceptible persons, a continued use of tartar emetic is injurious. The indications for, as well as against this medicine, are nearly the same as those which relate to vascular depletions.

485. *d. Cold water*, drunk in large quantity, has been praised by Lorry, Theden, Hilscher, and Hufeland in melancholia and mania. I have seen it beneficial in melancholia complicated with hysteria. Avenbrugger advised it in those cases especially which are attended by a desire to commit suicide. Falret and Guislain, however, observed no benefit accrue from it in such circumstances. It is probable that, in the very few cases in which it has proved useful, it has acted chiefly as a sedative of irritation in the digestive mucous surface and collatitious viscera, that has excited or perpetuated disorder of the cerebral functions. The remarkably large quantities of water taken almost hourly in most of these cases may likewise have tended to remove obstructions from some one of the abdominal organs. Cold water acidulated with the *vegetable acids*, and more especially with *vinegar*, was recommended by Buchoz, Theden, Locher, Selig, and Bang, as a sedative and refrigerant of the vascular system; and, in order farther to promote this intention, small doses of *camphor*, or of *camphorated vinegar*, were advised by Bona, Perfect, and others. *Nitre* was also similarly employed, either alone, or with small doses of camphor, so as to secure the refrigerant and sedative effects of the latter. Cold water, medicated in either of these modes, and in the latter more particularly, or by the addition of the *spirits of nitric æther*, is more likely to be of service than when used simply. *Muriate of ammonia*, however, is preferable to nitre in most cases, inasmuch as it combines a tonic influence with its refrigerant and sedative properties. *Acetate of lead* was likewise used by Schrœder as a sedative and refrigerant in mental disorders attended by vascular excitement; but no notice has been taken of it in such circumstances by recent writers. In conjunction with vinegar and narcotics, it is as likely to be of service in these disorders as in several others in which it has been lately employed. The *biborate of soda* and *boracic acid* were also formerly employed, in order to allay vascular action in connexion with mental excitement. They have long fallen into disuse; but I have had reason to consider them as still deserving of notice.

[The best sedatives in these cases we hold to be exercise in the open air, the shower bath, and flesh-brush; and especially the removal of all bodily restraints, and the constant manifestation of kindness, gentleness, and forbearance on the part of the attendants. Religious exercises, also, have often a wonderfully soothing and quieting effect upon the minds of the insane, far more useful than "poppy, mandragora, or all the drowsy sirups of the world." A glass of beer and a light supper at bedtime are recommended by Dr. Conolly as a very useful anodyne in many cases, where opiates would have no effect.]

486. *I. Stimulants* and *Antispasmodics* are especially indicated in nervous temperaments and delicate constitutions, or whenever the mental disorder appears in connexion with deficient nervous or vital power; when the head is cool, and the mental affection is independent of vascular fulness or action; when sanguineous depletions and alvine evacuations have been carried sufficiently far; or when exhaustion follows either these or the previous excitement. In other circumstances, particularly if the scalp continue warmer than natural, or the carotids pulsate somewhat more strongly, these may still prove of service, if refrigerants be applied to the head; or they may be conjoined, in such circumstances, with sedative and diaphoretic medicines. Of stimulants and antispasmodics, the most frequently useful are, *camphor*, *valerian*, *ammonia*, *asafœtida*, *æther*, and *the compound spirit of æther*. Others have been employed, as the *oxides of bismuth* and *zinc*, *castor*, *serpentaria*, *arnica*, *electricity*, and *galvanism*.

487. *a. Camphor*, in the circumstances just specified (§ 486), is a valuable remedy, and as such has been recognised by Wherlhof, Lobenstein, Kinneir, Fischer, Remer, Avenbrugger, Perfect, Percival, and Hufeland. On the other hand, Haslam, Prichard, and Burrows esteem it of little value. Its influence in this, as well as in other diseases, is very different, according to the doses and combinations in which it is exhibited. Many years since, I entered upon a series of experiments, in order to ascertain its operation in different conditions of the system; and, in a paper published some time afterward (*Lond. Med. Repository* for September, 1825, p. 245), I stated the result of my researches, and of my experience of it in some cases of mania, which I had seen with Mr. Alcock, Mr. Carroll, and others. Since then I have prescribed it in several cases, both of mania and melancholia, and generally with more or less benefit. Dr. Millingen, in a work just published, forms a juster estima-

* [Dr. Conolly states, that he has been entirely disappointed in the use of *digitalis* in mental disorders, and no longer employs it. Its depressing effects are often distressing, without being followed by any manifest benefit.—(*Loc. cit.*)]

tion of it than many other recent writers. He states it to be a valuable medicine, but requiring much discrimination. It is not advisable, he adds, when there is cerebral excitement, with a hot, dry skin, full pulse, and wild countenance; but where there is much restlessness and uneasiness, with a low, weak pulse, or cold and clammy skin, it will be found most beneficial. This is altogether in accordance with what I have stated respecting it in the paper just referred to. I have there shown that camphor in very small doses is refrigerant; but in full or large doses it is restorative, exciting the brain and nervous system, and consecutively calming and anodyne. In mental disorders, it should not be employed until alvine evacuations and sanguineous depletions, where these are required, have been duly employed. The combinations in which I have most frequently prescribed it, are with opium, morphia, or hyoscyamus, or belladonna, or with nitre, or with the solution of the acetate of ammonia, or with digitalis, or with James's powder, or other antimonials, or with the alkaline carbonates, or with acetic acid, or with any two of these that may be congruous with the circumstances of the case. Selig, Schoenheider, and Perfect prescribed camphor with vinegar, and Friborg, with nitre and opium, in maniacal cases. The dose of camphor in mental disorders, as well as the combination and mode of exhibiting it, ought to be regulated by the peculiarities of the case, and the effects of the previous treatment. M. Esquirol usually directs from half a drachm to a drachm to be dissolved in two ounces of vinegar, or dilute acetic acid, and given in an aromatic infusion in the course of the twenty-four hours. I have found this mode very serviceable in puerperal and hysterical mania, other appropriate means being also employed; but smaller doses are more appropriate in many cases. Cold applications to the head, the shower bath, or tepid bath, &c., may also be resorted to during its use, or when increased heat of the scalp or skin is caused by it.

488. *b.* The *infusion* and *compound tincture of valerian* have proved, in some cases of mania and of monomania, or melancholia, in which I have employed them, of great service, more especially in the states of these disorders already described (§ 486). When these affections are associated with hysterical symptoms, or when the patient entertains the idea of committing suicide, or has a disposition to indulge or to adopt any dangerous caprice, these preparations are often beneficial, particularly after appropriate evacuations, and in combination with the solution of acetate of ammonia, or with the alkaline carbonates, or with digitalis, hyoscyamus, &c. *Musk* has been advised, in similar circumstances, by Thilenius, Locher, Selig, Pargeter, and Gmelin; but it and *castor*, *ammonia*, *asafœtida*, the *oxides* of *bismuth* and *zinc*, and the *æthers*, are severally inferior to either camphor or valerian; yet they are often useful, especially as adjuncts to other stimulants and restoratives, or to narcotics or sedatives, or even to tonics, in the more strictly nervous forms of insanity, and in cases of debility and exhaustion.

489. *K. Tonics* were recommended by Sydenham, Selig, and Wintringham, and are obviously required in most of the circumstances in which stimulants and antispasmodics are indicated, and particularly in cases manifesting more or less of vascular inanition.—*a. Cinchona*, or the *sulphate of quinine*—the latter especially—is often preferable to other tonics, more particularly in the intermittent forms of insanity. The infusion of bark with the solution of the acetate of ammonia is most suitable when vascular or nervous excitement is passing into exhaustion, or in cases where the propriety of having recourse to tonics may seem doubtful. In circumstances of obvious exhaustion, or inanition; in the more purely nervous states of disorder; in advanced stages, after evacuations have been carried sufficiently far, or when the head is cool, and the pulsations of the carotid are not increased in strength or fulness, the sulphate of quinine, either alone, or with camphor and with the extract of aloes, if the bowels require to be kept freely open, will often be of service. I have given the following pills, varied with circumstances, in several cases of partial and general mental disorder; the first, when the bowels are costive; the second, when they are too relaxed. In this latter state, a combination of cinchona and opium was recommended by Ferriar.

No. 275. ℞ Quinæ Disulphatis ʒss.; Camphoræ rasæ ℈ij.; Extr. Aloës purif. ʒss.—℈ij.; Extr. Hyoscyami ʒjss.; Balsami Peruviani q. s. M. Fiant Pilulæ L., quarum capiat tres, bis terve in die.—Vel.

No. 276. ℞ Quinæ Disulphatis ℈j.; Camphoræ ʒss.; Extr. Humuli ʒjss. (vel Pilulæ Saponis cum Opio ʒj.); Syrupi Simp. q. s. M. Fiant Pilulæ xxxvj., quarum capiat duas, vel tres, bis in die.

490. *b.* The *arsenical solution* has been prescribed by Neumann, Winckler, Ackermann, and Seymour; and in states and circumstances of the disease for which I have advised the sulphate of quinine, and especially in the intermittent forms of insanity, is well calculated to be of service. It requires not only great discrimination in entering upon the use of it, but also caution as to the quantity prescribed, and the continuance of a course of it; as excess in either may be followed by inflammatory irritation of the digestive mucous surface, especially in the large intestines, or by endocarditis.

491. *c.* The *nitrate of silver* has been recommended by Agricola and Kesler; and, in circumstances truly indicating the propriety of tonics, and when insanity has been occasioned by depressing or exhausting causes, and in purely nervous cases, it may prove of service. It has been considered as more particularly suited to the complications of mental disorders with epilepsy. When, however, this association is dependant upon vascular or structural disease of the encephalon, little or no benefit can result from it. I prescribed it lately in one case of this kind, but was obliged to discontinue it. I have, however, found it of service in two cases of melancholia, with chronic irritation of the digestive mucous surface.

492. *d.* The *infusion* and *tincture of hop* have been recommended by Dr. Mayo; and, in the numerous circumstances and cases of the disease requiring both tonic and anodyne remedies, they are appropriate, and likely to prove serviceable. They, moreover, admit of various useful combinations with other remedies in mental disorders. The *preparations of iron*, and chalybeate mineral waters, have been employ-

ed by Lange and others. They are beneficial in several states of mental disorder, and especially in the more purely nervous cases, and in states of vascular inanition, or when derangement has proceeded chiefly from masturbation or exhausting discharges. The *sulphate of copper* has been prescribed by Boerhaave and Currie. It is suitable chiefly in diarrhœa occurring in chronic mania, and dementia. *Absinthium* was used by Aretæus and Paulus Ægineta, and the *muriate of baryta* by Hufeland.

493. *c.* Various other *stimulants and tonics* have been recommended by writers on mental affections; but very few of these require particular notice. *Phosphorus* is mentioned by Loebel and Kamer. Its powerfully stimulant qualities require great caution in its use. Formulæ for exhibiting it are to be found in the *Appendix* (F. 6, 7, 428). The extract of *nux vomica* is noticed by Murray and others: it also requires great discrimination in employing it (see F. 541, 542). Both these substances are suitable only in the more nervous forms of mental disorder, especially in melancholia and dementia, proceeding from exhausting and depressing causes, and in the circumstances indicating the adoption of the more energetic stimulants, and of chalybeates. In dementia and chronic mania, complicated with general palsy (§ 167), these medicines may be tried, upon the principle adopted by Celsus, "*Melius est anceps remedium, quam nullum.*" The *chelidonium* was prescribed by Muller, on account of its stimulant, laxative, and diuretic properties. As it promotes the secreting and excreting functions, and thereby exerts a deobstruent and alterative influence, it may be tried in mental disorders complicated with obstructions or other diseases of the abdominal viscera, and especially in melancholia. The decoction of *hypericum* was praised by Meyer and others. It is nervine and stimulant, and is most appropriate in the more purely nervous states of mental affection, and in melancholia, after sufficient alvine evacuations. Dr. Mayo observes, that the use of restoratives and tonics in the first stage of insanity is valuable in the nervous and serous states, but mischievous in the bilious and sanguine, and that, in the stage of exhaustion, they are required in every temperament.

494. *L. External Irritants* and *Derivatives* have been long and generally recommended in the treatment of mental affections. They may be divided into, 1st. *Irritants applied to the scalp*; and, 2d. *Irritants applied to parts more or less remote from the head*, so as to produce some degree of revulsion or derivation from the seat of morbid action.—*a. Scarifications of the scalp* were advised by Aretæus, Cælius Aurelianus, Walther, and Prichard; but they are admissible only when the scalp and head are more or less congested, or when inflammatory irritation or structural change is inferred to exist in the encephalon. In nervous and susceptible persons, and in states of general or local inanition of the vascular system, they may prove injurious. The application of the *actual cautery* to the occiput, or of *moxas* in the same situation, as advised by Pascal, Larrey, and Valentine; and artificial *ulceration* of, or *setons* or *issues* insert in the scalp, as prescribed by Horn and others, are indicated and contra-indicated by the pathological conditions just mentioned. Inunction of the tartarized antimonial ointment on the shaved scalp, until a copious eruption of pustules is produced, was advised by Munro, Autenrieth, Jenner, Gumprecht, and others, and has been found of service in some cases of mania, especially when the acute stage is beginning to decline, or to pass into the chronic state. The application of *blisters to the head* was recommended by Thilenius, Durr, and Hufeland. The practice is not without hazard, particularly in the more acute states of mental disorder. It is more appropriate in the more chronic and low forms of derangement, and especially in imbecility and dementia.

495. *b.* The application of irritants so as to produce a *derivative* or *revulsive effect* is appropriate in many of the more acute and early, as well as in the more chronic states of mental disorder; and yet, in very irritable, nervous, and susceptible patients, in the early stage of mania, and in cases where the vascular system is rather deficient than too full of blood, these irritants often increase disorder by exciting the general sensibility. Where, however, the disorder has been consequent upon the suppression of accustomed eruptions, ulcerations, and discharges, and in many cases of melancholia, or of other forms of monomania, derivatives and revulsants are often of much service. In the more acute and recent cases, and especially of mania, they should not be resorted to until vascular depletions and other evacuations have been employed.

496. Various *modes* of producing derivation of disorder from the brain have been recommended. Several of these are already noticed, as also falling under other heads, especially purgatives, warm bathing, &c. *Blisters* on the nape of the neck, or on the legs, &c., are often resorted to; but they are seldom of service in mania, especially in the early states. They are useful chiefly in the stages of disorder just mentioned. Guislain recommends them to the nape, back, or insides of the thighs or legs, when insanity commences with depression of mind, or melancholia, and in some states of dementia; but he has rarely found them serviceable in this latter state. Avenbrugger applies them to the region of the spleen in melancholia; and, when prescribed either to the epigastrium or to the hypochondria, they are sometimes of service in that affection. More advantage may be expected from *issues* and *setons* than from blisters, unless the latter be kept open for a considerable time. Zacutus Lusitanus advised setons or issues to be inserted over the region of the liver or spleen in melancholia. In the majority of cases, however, their insertion in the nape of the neck is preferable, especially in the other forms of insanity. *Dry cupping* in this situation is often of service. Dr. Burrows suggests the application of the cups as a derivative to the shaved scalp itself; and, doubtless, this place will often be preferable. I have, in some instances, caused the nurse or attendant to resort to dry cupping on the nape several times in the day, and to employ merely a large glass, tumbler, or any other convenient article for this purpose, and a piece of lighted paper.

497. The production of *irritation* or *artificial eruptions* on parts of the body still more distant from the brain, or on the surface generally, has

been advised, in order to remove irritation from this organ. They are commonly produced by the *tartarized antimonial ointment*, and by *frictions* with *croton oil*. Thilenius, Odier, Muzell, and Bartholomew recommend *inoculation of the itch*. Besides these, warm mustard *pediluvia*, *mustard poultices* applied to distant parts, and particularly to the lower extremities, the hot *turpentine embrocation* in situations remote from the brain, and *irritating* or *cathartic enemata* may severally be employed in circumstances which seem to require them, and especially when a tendency to coma or lethargy is observed.

498. *c.* Of the various *modes* of external irritation, Dr. Burrows and Dr. Muller consider *pustulation*, by means of the tartarized antimonial ointment or plaster, the best; and they prefer the application of it to the shaved scalp. Dr. Millingen prescribes it to the back of the neck. The choice of situation should depend upon the form and stage of disorder. In dementia, in cases attended by stupor or impaired sensibility, and when melancholia or mental depression is threatening to pass into excitement, the scalp may be preferred, after due evacuations have been procured. In some states of mania or monomania, this ointment, or plaster, may be applied to other parts. M. Guislain states that he has derived little advantage from it in dementia; but that he has sometimes found it of service in melancholia and in mania. Dr. Jenner published several instances of its success, when applied to the epigastric region, nape of the neck, scalp, and other situations. During the eruption thus produced, a restorative treatment is often necessary.

499. The insertion of *setons* in the neck is considered by Dr. Prichard to be most advisable in mental disorders of a chronic form; but he also recommends *issues* made by a long incision in the scalp, over the sagittal suture, where there is great intensity of disease, and a state of the brain threatening a fatal increase. In cases of stupor, and of dementia following apoplexy or palsy, or severe fevers, he believes this method more beneficial than any other. He also suggests a recourse to it in the complication of insanity with general palsy. M. Esquirol remarks, that *dry cuppings*, blisters, and irritating applications are most successful in cases consequent upon metastasis, in monomania attended by stupor, and in dementia uncomplicated with convulsions or paralysis. There can be no doubt of *counter-irritation* being more appropriate in cases characterized by torpor and insensibility, instead of morbid activity or excitement and intensity of feeling. Dr. Prichard observes, that in almost every case of paralysis, with a tendency to coma and lethargy, in which he has used this class of remedies, he has witnessed decided advantage from them. The opinions of Dr. N. Hill, M. Guislain, and of Dr. Mayo, are also in favour of these means.

[Observation abundantly proves that insanity presents as great variety, in relation to causes and circumstances, as any other disease whatever, and that no general treatment can be laid down applicable to all cases; in other words, there is no specific remedy against it, as it is no special disease, but arises from a variety of causes acting upon the mental functions, through their organ, the brain. The treatment naturally resolves itself into moral and medical, the former of which will be hereafter considered. The late Dr. Spurzheim was the first, next to our own Rush (who anticipated many of the recent discoveries in relation to the nature and treatment of mental diseases), who enforced the necessity of applying the general principles of pathology to the brain as well as to other parts of the body, and who pointed out the importance of treating its diseases in conformity with their nature, and with cerebral structure and functions, instead of resorting to a senseless routine, or the incongruous variety of means at the same moment, which were formerly in vogue. Dr. Rush had long ago remarked (*Med. Inquiries and Observations*, vol. ii., p. 22), that "it is, perhaps, only because the diseases of the moral faculty have not been traced to a connexion with physical causes that medical writers have neglected to give them a place in their systems of nosology, and that so few attempts have been hitherto made to lessen or remove them by physical, as well as rational and moral remedies." Pinel, on the other hand, attached but little, if any, importance to medical treatment, but depended almost solely on the moral management; the truth, as generally happens, lies between the two extremes.

In no country on the globe, it is believed, has the treatment of insanity been crowned with more flattering success than in the United States, as the statistics of our different institutions will show; and this success is doubtless owing to the happy mode of combining moral, medical, and hygienic means, which characterizes the management of this class of patients, both in our public and private practice. In this country, treatment is, to a great extent, regulated by those principles of pathology which modern researches have established, and which lead us to regard the proximate cause of insanity as corporeal, and seated in the brain. Dr. Rush led the way, by his truly philosophical work on the "Diseases of the Mind," in which he dwelt on the importance of the principle just laid down, and remarked, that "the successive and alternate changes of the different forms of madness into each other show the necessity of renouncing all prescriptions for its names, and of constantly and closely watching the disease."—(*Med. Inquir.*, &c., p. 237.)

In no class of diseases, then, is it more important to regard the causes of the disease, the previous health of the patient, the age and duration of the disorder, hereditary predisposition, former treatment, &c., in order to arrive at a knowledge of the true indications. The treatment proper for recent cases would be injurious to those of longer standing; and those which arise from mechanical causes require far different management from those which are occasioned by bodily disease, or by moral influences. That acute mania is sometimes caused by a hyperæmic or congested state of the brain, will not admit of a doubt; and here general and local bleeding, with cold applications early in the disease, will be attended with marked success; but that this condition is rare, and very liable to be mistaken for one of an opposite kind, is equally true. "There is," as Dr.

Conolly has recently remarked (*Clinical Lectures on the Principal Forms of Insanity*, &c., Lond. Lancet, vol. iii., p. 10, Am. ed.), "such an apparent superabundance of energy in the patient as to betray an inexperienced practitioner into hazardous measures. When the face is flushed, the skin warm, the pulse quick; when the voice is loud, the gesticulation vehement, it is difficult, at first, to believe that the vital power is not in excess; and when this state of morbid excitement lasts for weeks or months, it seems scarcely credible that there is all the time a tendency to sudden depression of all the energies of life, and that no violent remedies are admissible. Yet, in the most recent state, the condition of the circulation is seldom such as to encourage even one bold depletion; and, as the case proceeds, emaciation advances, signs of exhaustion are perceptible, and sometimes there is sudden exhaustion and death. I feel myself, therefore, justified in cautioning you most strongly against general bleeding as a rule in those cases. I am convinced that it is not often admissible, and that it sometimes does irreparable mischief, particularly if resorted to freely, or practised repeatedly."

Dr. C. states that some of the worst cases he has seen were those in which the patients had been largely bled before admission, and where the violence had been increased by the loss of blood. Pinel remarks, that the early symptoms of mania were often aggravated by the low diet to which patients were subjected in his day, and that one of his first measures was to supply them with an abundance of substantial and nutritious food; and he relates cases where, under the influence of such a diet, delirium rapidly subsided, and convalescence was speedily established. It is now, we believe, the general opinion among the physicians of our different lunatic hospitals, that although there may be cases in which bleeding may be useful, yet that they are very rare, and that the copious blood-lettings formerly recommended by Rush and Frank are altogether inadmissible. Dr. Conolly states that, in more than twenty years' practice, he has seen but two or three cases in which bleeding appeared to be useful; but has generally found it injurious, even in plethoric cases that seemed to warrant its use; and that, in six years' experience at Hanwell, he has found no encouragement to resort to it in a single instance. In two cases, he found its effects most unfortunate; in both, a state of imbecility ensued, and an inability or indisposition to speak, which lasted in each case more than twelve months; and in neither case was any amendment observed. Dr. C. is disposed to regard the excitement of the brain in mania as not dependant on increased action of the heart and arteries, a pathology which would seem to be supported by the fact that, in nearly all cases, the pulse is feeble, as well as rapid, and that symptoms of prostration of strength early supervene. The same objections, however, do not apply to local as to general blood-letting, which is not only often admissible, but extremely serviceable. Leeches will generally be found preferable to cupping.

The late Dr. Todd, of Hartford, Connecticut, was one of the first to prove the superiority of the tonic, anodyne, and soothing treatment, over the depleting and antiphlogistic in mental diseases; the ratio of cures in recent cases under his management being as high as 91 per cent. He made great use of *conium maculatum*, *stramonium*, and *hyoscyamus*, and of the different preparations of *iron*, together with *wine* and *cinchona*, in the treatment of the insane, and found them more efficacious than any other remedies.

We subjoin the following remarks on the medical treatment of insanity from the pen of the late Samuel White, M.D., of Hudson, New-York (*Address on Insanity*, delivered before the N. Y. State Med. Soc., Feb. 5, 1844), as they are believed to represent the views of a majority of our physicians who are devoted to the treatment of the insane, and especially as they imbody the experience of a long life of laborious toil employed in the management of this class of diseases.

"In the therapeutical treament of insanity," says Dr. White (*Address on Insanity*, p. 12), "every case must be considered and treated as an insulated one. Remedies must be applied to the constitution and peculiar features of each case. While the first indication is to remove or lessen, as far as possible, irritation as the immediate cause, pervading the cerebral and nervous system, and through sympathy the vascular, yet are we to bear in mind the condition of other remote organs morbidly excited, and participating in the general disturbance. For instance, the associative powers of the stomach as a central organ are immensely important, as it regards the phenomena of disease. So also, through arterial agency, defective secretion of the gastric juice, and loss of power in the secerning system, we account for local congestion, impaired appetite, and waste in fevers.

"Remedial means, when rightly applied, need be but few. And what is the popular aim, in the cure of diseases, at the present day? but to sustain the conservative principle, the strongest in nature, by the revulsion of excitement to parts less essential to life, and equalizing circulation. Hence the importance that our first move, in the treatment of incipient insanity, should be based upon a correct diagnosis; critically regarding the necessary distinction ever to be maintained between phrenitis and active mania. The one concentrated inflammation, affecting the substance and meninges of the brain; the other irritation, specifically embracing the nerves of sensation and volition, sympathetically disturbing every function and fibre of the human system. The first demanding bold depletion as the anchor of safety; the latter to be approached cautiously, by milder and more comprehensive means, as we shall proceed to enumerate.

"Here, then, permit me to remark that no one is competent to endure this searching ordeal who is not well versed, analytically and pathologically, in every branch of medical science.

"Copious abstractions of blood should ever be avoided in insanity, as endangering dementia. Very few are the cases of insanity, even in its incipient stage, that admit of venæsection. In such only as are plethoric and in the vigour of life is it admissible at all, and then only in a cautious degree. The pulse is deceptive; for though there may be increased im-

petus of blood in the carotids, yet they will be found compressible, and the radial artery feeble in its action, showing an unequal distribution rather than congestion. In such cases, where symptoms seem urgent, topical bloodletting, by leeching or cupping, may safely be resorted to without danger of collapse. In the treatment of six hundred cases, venæsection has not been resorted to in more than one in a hundred after they entered the institution, and then only moderate in quantity. Many, however, have been brought to the asylum after two or three copious bleedings, undoubtedly with the best intentions; yet the results have proved a prostration of the vital energies, more difficult to overcome than the original disease."

"Active emetics are seldom admissible, as tending to a determination to the brain. Where there is great derangement of the digestive organs, ipecac and calomel combined, in such quantities as to produce an emetico-cathartic effect, may prove salutary in their operation; so also the blue mass, with one fourth part of ipecac, adds to its efficiency in restoring the functions of the liver.

"Drastic purges are seldom advisable; laxatives, to keep up a steady action of the intestinal tube, are far preferable, and may be aided by injections, due exercise, and a well-regulated diet. No particular formula can here be laid down. The judgment of the physician must decide on the quantity and appropriateness of the article, according to the constitution and peculiarities of the patient.

"Narcotics and sedatives are next in order. Opium, camphor, morphia, stramonium, conium, belladonna, and aconite are most to be relied upon, but require great prudence as to the time and manner of their administration. These are often improved by combination with other remedies; for instance, opium, ipecac, and soap, equal parts, form a pill much easier given than Dover's *powders*. Camphor mixture, with half a grain of tart. antimony, and five drops of laudanum to the ounce, given in half ounce doses, is a powerful sedative and adjuvant in allaying nervous excitement. Morphia with colchicum, when there is a gouty or rheumatic diathesis, endangering metastasis, is a valuable auxiliary in treatment. Stramonium acts specifically on the sensorium, stimulating the absorbents. A saturated tincture of the seeds in camphor mixture is the best mode of administering it. Conium is best combined with the different preparations of iron. Belladonna and aconite are often improved by combination. Extracts of these vegetables can only be relied upon when evaporated by solar heat.

"Counter irritants, revulsive in their effects, are valuable auxiliaries, more especially in metastasis and suppressed eruptions, and are more cheerfully submitted to when allayed with some of the vegetable narcotics endermically applied.

"*Bathing*.—One of the most powerful remedial agents in equalizing circulation is the warm bath. The patient should be immersed from twenty to thirty minutes, the heat at 96 Fahrenheit, refrigerating the head while in the bath, when the heat of the part should indicate its necessity. Warm bathing will be found particularly beneficial and appropriate in melancholia and delirium tremens. Fixed alkaline salts added to the water are useful in removing the sebaceous oil from the surface of the body. The nitro-muriatic bath is a valuable and effective agent in a congestive state of the liver, and should be repeated in connexion with the usual remedies, until we have evidence of a healthy secretion of bile. The value of the shower bath is known to all, yet it is too indiscriminately used. Great prudence and watchfulness are necessary in its application. Should atony prevent a suitable reaction and warmth over the surface, it may do serious and lasting injury. A pitcher of cold water poured over the back part of the head is often grateful as well as useful to the patient.

"In the second stage of insanity, a more tonic treatment becomes necessary, and it is to be regulated according to the age, constitution, and temperament of the patient. The various preparations of iron, nitrate of silver, followed with a solution of iodine to prevent a discoloration of the skin, conjoined with suitable moral treatment, will often decide the future prospects and destiny of the patient."—(*Loc. cit.*)

"Insanity is a physical disease," says Dr. Woodward (9th *Annual Report*, p. 79), "and as susceptible of cure, by remedies which make impressions upon the system, as any other disease of equal severity. Like other diseased organs, the brain often suffers by sympathy with other parts diseased, and the cure of the primary affection relieves the secondary in the usual way.

"The influence of Dr. Rush's notion of the utility of liberal bleeding in insanity still clings to the physicians in the country generally, and we rarely have a patient committed to our care who has not been copiously bled. The physicians in the charge of the institutions, both in this country and in Europe, have long since abandoned this practice as rarely beneficial, and often hazardous. It is a frequent remark, that it is often more difficult to cure the evil that arises from the loss of too much blood than to remove the insanity in violent cases of recent attack.

"The condition in which the patient is found in violent mania, when the physician visits him, is not always duly considered. The great excitement of the pulse, the distention of the blood-vessels, the heat and redness of the skin, and the amazing muscular power which they sometimes exert, only show what he has done, rather than the condition in which he is; they are the effects of his amazing excitement, and not the symptoms of his disease. A little cold water or ice applied to his head will afford him greater and more immediate relief than the loss of a pound of blood."

"In a case of genuine mania, there is usually no inflammation of the brain or its appendages; the excitement is much more frequently of a nervous character, and will yield more readily under a mild and safer treatment. Local bleeding, cupping, ice to the head, mild cathartics and narcotics succeed far better, and are less hazardous. Many cases yield like a charm to narcotics, if the system is prepared for their use, and they are prescribed in a proper manner and with discrimination. Bark and iron, combined with narcotics, do well when excitement has abated and the strength requires to be restored.

"In chronic cases of insanity, tonics, narcotics, baths, laxatives, and remedies that tend to remove local disease, if it exists, are often found beneficial. In certain torpid cases, the cold bath, with stimulants and acrids, is a valuable auxiliary in the cure."

"One thing is well established, that the insane cannot be as well treated at home as with strangers, nor as well in a private family as in an institution. Few physicians can give to them the attention which they require, or persevere a sufficient time with such remedies as they need, or with sufficient regularity.

"The insane man is the only one who discards the kind offices of his friends at the time when he most needs their aid and solace, and throws himself upon strangers.

"In chronic cases, much benefit arises from a perseverance with remedies for a much longer period than most physicians would prescribe them, or most patients pursue them."]

500. iii. Moral Treatment. — Recourse to moral management has either been too much neglected, or too exclusively adopted. It is but seldom that the truly philosophic physician is satisfied, even in the present day, that physical treatment is duly associated with moral management; or that either, or both, are appropriately directed to the removal of existing pathological conditions, and of the associated mental disturbance. Yet both physical and moral means should be judiciously conjoined and directed to the peculiar circumstances of each case. It is impossible, especially in my confined limits, to describe the impressions which should be produced, and feelings excited, in order to combat the various states of mental disorder that come before the physician. These means, to be appropriate and beneficial, must necessarily vary in each instance, and be so entirely based upon the ever-varying phases of disorder, as not to admit of description. Yet much useful information on this subject, and even the principles of moral management, will be found in the writings of Sir H. Halford, Dr. Mayo, Dr. Prichard, Dr. Burrows, MM. Guislain and Esquirol.

501. *a.* It is chiefly at the commencement of mental disorder, and when the stage of excitement is about to lapse into comparative calm, that moral treatment is most beneficial. Still, it should not be neglected at any period, as long as the patient retains any power of comprehension. Dr. Mayo observes, that, supposing the morbid state to be commencing, every effort must be made to strengthen the influence of the will. The patient, at this period, gradually surrenders himself — though not without a struggle — to some prevailing idea, fear, or delusion: he supposes his friends to be conspiring against him, or insulting, or watching him; or he believes calamities of various kinds impending over him. Meanwhile, he is struggling against the morbid impression. His efforts, therefore, whether manifest or not, must be aided when right, and his mind tranquillized. His fears should be shown to be unfounded, and his hopes excited and encouraged. To administer this aid is generally a matter of difficulty. The danger of mischief to himself or others, as well as the occasional necessity of repression, dictates *surveillance* (which is always irksome and distasteful), when it is most requisite to conciliate regard.

502. In this state of commencing or impending insanity, the morbid sensations or perceptions, and the unreal ideas or assertions of the patient, should not be rudely contradicted, and imputed to imagination. They are *real to him;* and to controvert them is the readiest way to irritate the mind, to destroy all his confidence in the judgment and friendship of his adviser, and to strengthen and confirm the disease. His mind requires to be soothed, diverted, and abstracted from the fears and anxieties by which it is absorbed, depressed, and exhausted. He should be told that his feelings and perceptions will soon change, as his health improves; he should be comforted by admitting the justness of his complaints, and cheered by attributing them to a temporary disorder of his general health, which will be removed by suitable remedies; and these remedies ought always to be resorted to, in order, both that such disorder, which is never absent, may be cured, and that his confidence may be gained. At the same time that such admissions are made, and that the utmost kindness and encouragement are evinced, the greatest firmness must be exercised: nothing should be yielded that ought not to be conceded. He will thus be brought to look for support, and to trust to it, against his own instability and weakness of purpose, as well as for aid in his struggles against morbid impulses and desires. In this incipient stage of mental disorder, much consequent mischief may be prevented by judicious moral management — by moral and religious consolations, mental abstraction, and diversion; by firmness, kindness, and moral control; by change of occupation, of scene, and of air; by travelling or voyaging; and by the amusements and intellectual *agrémens* of society. Foreign travel is generally preferred in these cases, as affording greater novelty; and visiting watering places and mineral springs, in connexion with travelling, presents several advantages. These conspire, with other circumstances, to excite, or to preserve hope, at the same time that they may be beneficially directed to the removal of physical disorder. At this period, nervous power is depressed by the continued operation of debilitating fears and sensations, while the assimilating, secreting, and excreting functions are impaired; and hence, recourse to chalybeate, sulphureous, or saline waters, or to various combinations of these, in conjunction with moral influences, is frequently of the greatest benefit, especially in the hypochondriacal and melancholic states of disorder. In addition to these, regular *exercise* in the open air, particularly walking and riding, and, still more, exercise and occupations which interest the thoughts, and engage the feelings in an agreeable manner, as tennis, cricket, fishing, shooting, hunting, gardening, farming, &c., should be enjoyed, with due precautions against injurious physical agents. The patient should almost altogether live in the open air; but the air should be dry and temperate, and the situation elevated. In unfavourable weather, in-door exercise and occupations should not be neglected. Amusements, also, may be often permitted, especially billiards, chess, backgammon, &c.

503. *b.* Even in the more *violent mental ex-*

plosions observed in mania, or when intense *reaction* follows upon depression or melancholia, moral restraint and discipline are often of great service. The union of firmness with kindness, even in such circumstances, is not to be laid aside. As M. Pinel observes, the physician sustains, in these cases, the sentiment of his dignity, and the principles of a pure and enlightened philanthropy. He allows the maniacs all the liberty compatible with the safety of themselves and of others; conceals from them the means of constraint which he is obliged to employ; and treating them with indulgence, leads them to suppose that they are only submitting to the laws of necessity. M. Georget remarks, that active and incessant inspection must be exercised, particularly in an asylum, over both patients and attendants. Lunatics evincing a disposition to suicide should never be a moment out of sight. It is often necessary to confine violent patients, and those who are addicted to indecent practices, with the strait-waistcoat. The only measures of punishment, he adds, that should be practised, are the strait-waistcoat, seclusion in a cell, the shower bath, and some occasional privations. Dr. Prichard justly observes, that all means of punishment and intimidation should be used as sparingly as possible, and be of the most harmless kind. Solitary confinement and the strait-waistcoat are sufficient in ordinary cases. M. Foville has recourse to the cold shower bath, and to cold affusion on the head; the violent maniac being seized by a number of attendants, and subjected to the affusion until he becomes subdued. The circular swing has been used with a similar intention; and after it has been once used, a threat of its repetition is frequently sufficient; but the cold affusion is a safer remedy. When obstinate lunatics refuse to take food or medicine, persuasion should be first tried, and if it fail, threats and harmless punishments may be adopted. The stomach-pump may be had recourse to in these cases; the use of it on one occasion will generally prevent the necessity of again employing it.

504. M. Guislain justly remarks, that the physician ought, as much as possible, to abstain from saying or doing anything before a lunatic calculated to inspire fear or dread, or by which he might become an object of aversion, or lose the confidence of the patient. Some other person should appear to be the agent in all restraints or punishments that may be required; and the physician should be regarded as the protector of his patients, and the dispenser of kindnesses and indulgences.

505. *c.* When the *acute stage*, or the period of excitement, has passed, a calm usually follows; and in this state of comparative composure, the morbid delusions adhere to the mind less pertinaciously. The patient himself often begins to doubt their reality, and his estranged affections seem disposed to return. The observations of Sir Henry Halford on the moral treatment of this period are particularly deserving of attention. "If, at this auspicious moment," observes this able physician and classical writer, "the intercourse of a discreet friend be permitted, it will cheer the patient's heart; while, by kindness and attention, the physician will easily get possession of his returning confidence, and *so* induce him to unbosom himself of the distempered notions which still continue to haunt him. These, although they be founded in palpable error, the physician will not combat, although he will take proper opportunities of hinting his doubts of their reality. He will never deceive his patient, but take pains to prevail upon him, whenever they recur, to refer them to his unbiased and more practised judgment; and to be guided by that rather than by his own, in estimating the correctness of such opinions. He will act, as it were, upon a system of education, and will aim thereby at confirming the spirits and strengthening the mind of the convalescent; and as the discipline employed in youth encourages and enforces the predominance of reason over the passions, so will discreet converse assist in restoring reason to her seat, and in giving her back again her proper sway over wild impulses. He will engage the mind agreeably, by presenting to it new objects, and by recalling former pursuits to their wonted acceptance." "Had the patient, before he was ill," Sir H. Halford continues, "any favourite amusement of a harmless nature? Was he fond of *music*, for instance? Music, without exercising the attention severely, has the power, however, to fix it; therefore, with this 'sola voluptas solamenque mali,' the only gratification, perhaps, of which he is capable at this period of his mental darkness, he may be indulged immediately." "Or, had the patient, before he became insane, a predilection for any particular studies? Would he take the counsel of Lord Bacon, and entertain such as fill the mind with splendid and illustrious objects, as histories, fables, and contemplations of nature? Or, did he prefer mathematics? and can he now be prevailed upon to enter upon a course of such reading? Plato has called mathematical demonstrations the purgatives of the soul, as being the most proper means to cleanse it from errors, and give it a relish for truth. Certainly, nothing more entirely bars the intrusion of thick-coming fancies, by occupying the whole mind, than mathematical studies." Sir H. Halford states, that Dr. A—— became deranged, while practising physic in the country, and, after a separation from his family for some months, was advised to resume the study of Euclid, having dropped hints of his partiality to it. He did resume it with the happiest effect, and recovered at length so entirely as to commence business in London, and to practice until his death.

506. Experience has shown that monomaniacs are injured by directing their attention, or by adverting in any way to their illusions. It is, on the contrary, requisite to engage their minds, as much as possible, with very different subjects, and with external objects. Still, authors have adduced instances of persons having been cured of their delusion by some deception. Thus, M. Esquirol states, that a lunatic would not pass his urine, because he supposed that, by doing so, the world would be subjected to a second deluge. He was at last prevailed upon by being told that the town was on fire, and that he could save it from the flames. But any advantage obtained in this manner is generally only temporary. During convalescence, powerful impressions on the mind, even in connexion with the patient's delusion, may rouse the

patient, as if from a dream, and thus dispel the unreal impression. A female patient had taken the most violent dislike to her family; the tidings of the death of a son in a foreign country excited in her a desire to see her surviving children, and recalled all her parental affection, instantly sweeping from her mind her insane antipathies, and restoring her to right feeling and reason.—(*Rep. of Glasg. Asyl.*, &c., for 1839.)

507. On this subject Dr. BURROWS remarks, that to reason with a lunatic is folly; to oppose or to deny his hallucinations is worse, because it is sure to exasperate: an impression on him can be made only by talking *at*, not *to* him. He will often notice what is said to others, and apply much of it to his own situation or delusion. To endeavour to convince him, or to break the catenation of his morbid ideas by trick, fraud, surprise, or terror, is always attended by hazard. The chances are very many that it will not succeed; and if it fail, the case is thereby rendered more intractable. "The confidence of his patients," Dr. BURROUGHS adds, "is the sure basis of the physician's success. A cheerful, encouraging, and friendly address; kind, but firm manners; to be patient to bear, but cautiously prudent in answering; never making a promise that cannot safely be performed, and, when made, never to break it; to be vigilant and decided; prompt to control when necessary, and willing, but cautious, in removing it when once imposed; these will always acquire the good will and respect of lunatics, and a command over them that will accomplish what force can never attain."

508. Moral management must necessarily vary with the states of the disease. In the more violent state, restraint and medical discipline should be applied until violence subsides. In the more passive states, restraint is never necessary, unless there be a propensity to suicide, or to a solitary vice which is so frequently a cause of, as well as often an attendant upon the mental disorder. To prevent this latter propensity is extremely difficult; but various means may be had recourse to with advantage, and these will readily suggest themselves.* Vigilance is necessary in all cases; for the passive may change in a moment to the active or violent state, and mischief may thus be done before it can be prevented.

[The results of experiments that have been made of late years, especially by Dr. CONOLLY, of Hanwell, justify us in the conclusion that restraint in violent cases is inexpedient, unnecessary, and always hurtful. The following remarks of Dr. EARLE, of the Bloomingdale Asylum, on this subject, express, it is believed, the views that generally prevail among those who have charge of insane institutions in this country:

"The means of bodily restraint, 'tranquillizing chairs,' straps, muffs, wristbands, mittens, and other appliances for the confinement of the body and limbs, have been considered as necessary evils, or, perhaps, by some as necessary promoters of good, in establishments devoted to the accommodation of the insane. Hence they have been employed, even in very recent time, to a much greater extent than was necessary.

"In our individual experience, we have found that, in proportion as we have become acquainted with the insane—with their tempers, dispositions, habits, powers of self-control, and capabilities of appreciating the ordinary motives which influence the conduct of mankind—has our opinion of the degree to which these means are necessary been diminished. Our practice has corresponded with this change of opinion, and the results have been eminently satisfactory. At the present time there is no patient in the asylum upon whose body or limbs there is any apparatus of restraint. In the men's department, no such means has in any instance been resorted to during the last six weeks, and in but a single instance during the last three months. In the case alluded to, a patient whose ordinary conduct is unexceptionable, but who is subject to sudden and uncontrollable impulses to destructiveness, acting under the influence of one of his paroxysms, broke a chair and some windows, and his hands were confined by wristbands two days.

"The so-called 'tranquillizing chairs,' which had for many years been among the means of restraint, were taken from the halls in April last, and neither of them has since been used.

"It has heretofore been customary to keep a supply of the other kinds of restraining apparatus in each hall throughout the establishment. About the 20th of November, everything of the kind was removed from the men's department, and deposited in the physician's office, where it has since remained undisturbed. And yet, during the period that we have been connected with the asylum, there has been no equal extent of time in which there was so general a prevalence of quiet, order, good feeling, contentment, and reasonable conduct as during the last six weeks; and, in support of this statement, an appeal may with confidence be made to the other officers and the attendants of the institution, as well as to those gentlemen of the committee who have visited the several departments of the establishment during that time. It is not asserted, for it is not our opinion, that restraints upon the limbs are never necessary. On the contrary, we believe there are cases in which the application of them is the most judicious course that can be pursued. We once heard a patient beg most earnestly to have her hands confined, lest she might injure herself. There is a female now in the asylum who is subject to frequent and very violent spasmodic paroxysms, or 'fits,' in which there is an uncontrollable propensity to bite herself. If her hands be unconfined, she immediately plunges her teeth into the flesh of the fore finger, the upper portion of the thumb, or the arm. We have no hesitation in regard to the propriety of confining the hands in a case like this. One of the means of restraint, among the most simple, effectual, and least offensive to the pa-

* Sir W. ELLIS recommends a pair of wide canvass sleeves, connected by a broad shoulder-strap, so as to rest easily on the shoulders. They ought to come up well on the shoulders, and to extend about an inch beyond the points of the fingers; the part covering the hand being made of stiff leather, to prevent the hand grasping anything. They keep the arms hanging easily by the sides of the body. They are fastened at the back by two straps, one going from one sleeve a little above the elbow, across the loins to a similar position in the other sleeve; a second lower down; and by three similar straps in the front, the latter being secured by buckles. This mode of restraint is less heating, and produces less pressure on the chest, than the common straitwaistcoat.

tient, is the *Camisole*, the only distinguishing peculiarity of which is, that the sleeves are of about twice the length of those of ordinary garments. This being on, the patient's arms are folded, in the manner frequently adopted by persons in health, and the two sleeves are tied together behind. Thus there is no pressure upon the body or limbs, no liability to abrasion of the skin, as with the wristbands and muffs, and the limbs are in a position as easy and agreeable as any in which they can be placed." (Earle, *24th An. Rep. Bloomingdale Asyl.*, 1844, p. 34.)

"Whenever they have been brought to the asylum in chains," says the late Dr. White, "I have made it a point to remove them with my own hands, as I am sure, by so doing, to gain permanently the confidence of the patient.

"I once took by the hand a furious son of the Emerald Isle, and held an exciting dialogue respecting the heavy chain cast round his ankle and bolted to the floor. Though warned of my danger, as I approached him with a pleasant salutation, he as cordially responded, and received me as his friend. We at once made a binding contract: I was to knock off his chains, when he should be placed under my care, and he was to become my body-guard, and be obedient to all the rules of my house. A few days after, the bargain was consummated, and he remained faithful to his trust."

"No other restraint is put upon our refractory patients, under sudden impulses, than seclusion for the shortest possible period of time, and the use of a belt cast round the waist, with wristbands or a muff attached, to prevent them from tearing their clothes, and committing other mischievous acts while at large." (White *on Insanity*, p. 15–16.)

In the New-York Lunatic Hospital, we are informed that, besides seclusion, "leather and cloth mittens, and leather muffs and wristbands" are the only means of restraint; that strait-jackets and restraining chairs have never been in the institution; and that the violent and excited are more easily calmed by the warm bath, by cold showering to the head, and sometimes narcotics and opiates. "No better evidence," says Dr. Brigham (*First Annual Report*, p. 52), "need be given of the general disposition of the insane to be quiet and orderly, when properly treated, than the fact that here have been, for several months, from thirty to forty men associated together, in each of our halls, not one of them under the least bodily restraint, and yet no accident of any importance has occurred, nor injury to any individual."]

509. *d. During convalescence* especially, moral treatment requires the greatest judgment and discrimination in all its relations. In this period, the dawnings of reason should be carefully observed and assisted, and every aid afforded to the struggling efforts of nature. The bodily disease is now loosening its hold over the mental powers; and these powers may be now aided in emancipating themselves from the morbid bondage. The suggestions, and, occasionally, the reasoning of the physician, advanced with kindness and sincerity, and in the soothing language of friendship, in this stage, often assist in removing weakened and decaying delusions. When convalescence approaches with a revival of the affections, the consolations of the physician are often requisite to calm the feelings which thus burst forth, and to guide them in right directions; or his encouragements are necessary to elicit them, and to give them permanency. Dr. Burrows justly remarks, that if, in reasoning with the patient on any remaining delusion, a painful recollection is revived, the subject should be changed, and resumed at another time. If any domestic event have occurred, during the loss of the patient's reason, likely to excite a strong feeling of joy or of grief, it should be withheld until the mind has acquired strength to bear it; and, even then, caution in communicating it is requisite. One of the most important and delicate tasks, in communicating with a convalescent as to the past and present, is, to preserve a due medium between gratifying and checking his eager importunities for information. Too great a flood of reminiscences, called up by much information, may endanger the mind enfeebled by disease. The recollections of the past affect different minds very differently. With some, the retrospect is a perfect blank; others remember the past as a dream; others recollect all its realities. Some refer to the past with indifference; others advert to it with gratitude to those who contributed to their recovery; others recall it with pain and abhorrence, and avoid all reference to person, place, or circumstance connected with it. Whatever may be the impression on the mind of the patient, it should be carefully noted, and the conversation with him should conform to it.

510. *e. Religious consolation* is frequently of the greatest benefit in the partial and chronic forms of insanity, when judiciously resorted to. It has been, however, supposed by some to be injurious, or of doubtful advantage, because religion is sometimes a cause of the malady; but, as I have shown (§ 293), it is only mistaken, unsettled, and fanatical views of Christian doctrines that occasion, in some instances, mental disorder; and, even in these cases, as well as in many others, the truths and consolations which true religion affords may be made most efficacious means of cure, when judiciously placed before the mind of the patient, at a proper season, by the well-educated and sober-minded clergyman, and when the physician finds no circumstance contra-indicating the propriety of having recourse to them. Mr. Tuke very judiciously remarks, that the mild but powerful influence of the precepts of our holy religion, where these have been strongly imbued in early life, become little less than principles of our nature; and their restraining power is frequently felt, even under the delirious excitement of insanity. Before, however, religious consolation or instruction should be attempted, some information should be acquired of every patient's former and present opinions and state of mind; and then religion will often be most advantageously brought in aid of physical and moral treatment; and will tend not only to the restoration of the mental powers, but also to the preservation of them subsequently. The minister of religion, in order to be useful, should have free intercourse with the patient; and administer consolation, or remove doubts, rather by private communication than by more public instruction or preaching. When the latter is attempted in an asylum, a judicious selection ought to be made of the patients, and the dis-

course should be suited to their states—to inspire hope and confidence—carefully avoiding whatever may perplex the mind, or cause fear or alarm.

511. In a recent report of the Glasgow Asylum for Lunatics, it is stated that, in many instances, the personal and private, as well as public ministrations of the chaplain, have carried consolation and comfort to the minds of the patients, particularly those troubled with distressing apprehensions on religious subjects. The sermons delivered in the chapel are described as being adapted, as much as possible, to the peculiar circumstances of the audience, and as being the means of withdrawing their attention, for a time, from their prevailing illusions. Everything that is conceived to have a tendency to agitate the mind is carefully avoided, and pains taken to present the most soothing and practical views of divine truth. Two very important advantages are derived to the patients from the institution of public worship—that of alleviating the malady under which they labour, and that of gratifying and strengthening those pious feelings from which they derive the greatest consolation.

512. *f. Employments and Amusements.*—*Exercise*, by equalizing the circulation, by determining it to muscular structures and to the extremities, and by promoting the exhalations and secretions, is of great service in the partial and chronic states of insanity. But it must be varied according to circumstances, and to the previous habits, conditions, and occupations of the patients. Walking and riding in the open air, or long walks in fields and woods, in company with a suitable guardian, during as great a portion of the day as the strength of the patient will permit, are often of great service. All establishments for the insane ought to be provided with the means of affording to their inmates regular exercise and employment in the open air. They should also be constructed with galleries and covered courts, freely admitting the air, where the patients may take exercise in wet weather. Gardening and various agricultural occupations should engage a considerable portion of time at stated periods of the day. In manufacturing districts many lunatics may be made to follow, as a means of distracting their minds from their delusions, their several callings. In the *Salpêtrière*, the women are permitted to sell a part of the produce of their industry, and to apply it to the relief of their necessitous families. Females and men of sedentary habits should be engaged, as much as possible, in some regular occupation. In many asylums, especially abroad, the females are occupied in embroidery, in spinning, knitting, sewing, and various fancy works. Most lunatics are disinclined to work; but kind entreaties, or the prospect of procuring the means of extra comforts, will often tempt them to do something. Even in the early stages of dementia, it is not impossible to induce such patients to work at some merely mechanical occupation. Employments, suited to the previous habits and stations of the patients, mitigate the disease, and tend much to promote the recovery of curable cases. Where the taste and previous occupation of the patient leads to study or sedentary pursuits, these should not be indulged for too long a period without relaxation, or to the neglect of proper exercise in the open air. The greatest difficulty is to find employment or amusement for the higher classes of lunatics. They soon tire of the same pursuit. Reading, chess, cards, bagatelle, billiards, and other games, should be diversified with bowls, tennis, gardening, walking, cricket, and various athletic exercises.

[In many, if not all American institutions for the insane, reading-rooms are provided for the patients, which are furnished with books, newspapers, and periodicals, and which are read with much interest by many of the inmates. Writing-books, arithmetics, and slates are also placed in the hands of some, which contribute essentially to their entertainment and instruction. At the Bloomingdale Asylum, Dr. Earle has made trial of the effect of delivering a series of lectures on miscellaneous subjects, illustrated by diagrams and pictures, handsomely painted on canvass, which a large number of the patients regularly attend, and with very happy results. At this institution, as well as at the State Hospital at Utica, &c., a regular school is carried on, which is attended by many of the inmates, and thus far the effects have been highly beneficial. As some of the faculties usually remain sound in mental derangement, we deem it very essential to recovery that these should be diligently cultivated. Where there is a taste for drawing, music, or mechanical contrivances, as turning, whittling, &c., that faculty should be employed; and the patient should be tempted to make the best exertion he can with his intellect, which not only contributes to his happiness and comfort, but powerfully tends to substitute sound for unsound ideas; or sanity for insanity. The moral faculties must also be attended to, and the feelings brought into a healthy channel, which can never be done if restraint and harsh measures are employed, the object of which will always be mistaken by the patient. If the mind can be brought into a pleasurable state of excitement, and kept in that condition, while the mental faculties are agreeably occupied, if there is no organic disease present, a speedy recovery may be confidently anticipated. To ensure this, however, mental occupation and bodily exercise should go together.]

513. *Music* has been considered useful by several writers, as a means of abstracting the attention of lunatics from disordered trains of thought. M. Guislain observes, that music is useful with reference, *first*, to those who play upon some instrument; and, *secondly*, to those who listen to it. It should also be viewed both as a means of beneficially exercising the mind, and as a mere amusement. Persons who can use a musical instrument, and those who are fond of music, will sometimes derive advantage from it; but it is doubtful whether or not it will afford any benefit to others. Dr. Prichard states, that Dr. Cox considered that some advantage was derived from it as an amusement; but that it is of little importance in the treatment of insanity, is proved by the circumstance of Dr. Bompas, the successor of Dr. Cox in the asylum conducted by him, having discontinued it. M. Esquirol remarks, that he has very rarely obtained any advantage from music. It sometimes calms the spirits, but it exerts no curative influence; it may even render maniacs

more furious. He, however, admits its beneficial influence during convalescence, particularly of those who have cultivated music or who are fond of it. In the more lethargic or dull states of madness, in melancholia, and in other forms of partial insanity, it is often of service, while it may prove injurious in some cases of mania, more especially those characterized by a tendency to violent excitement. When the patient has been a performer, playing on his instrument is allowable, as innocently employing both mind and body.

514. *g. Visits of Friends, and Restoration to Society.*—Convalescence is often checked, and the disorder reproduced, by the patient's impatience to be freed from all restraint; and the same effect is too often caused by the impatience and distrust of friends. During convalescence the physician has not only, as Dr. BURROWS observes, to encourage every dawning sign of returning reason, to employ the soothing language of friendship, and to calm the agony which reminiscence often generates, but also to repress impatience, and to contend with and remove the suspicion and want of confidence, which his cautious course usually produces in relations and friends, and which, if not steadily resisted, endanger the approaching recovery of his patient. The chief risks to which convalescence is exposed, are the *premature visits* of friends, and *removal* from the proper sphere of treatment to an intercourse with relations and society, and with business and its various contingent annoyances and distractions, before the action of the brain and the manifestations of mind have been sufficiently restored or the restoration adequately confirmed. The difficulty of determining when friends should be admitted and when the patient should be restored to society is generally great, and the evils resulting from a too long seclusion are sometimes not much less than those which might accrue from premature intercourse. The experience and good sense of the physician will enable him to arrive at a just conclusion with reference to particular cases, for no general rule on this subject can be laid down. When convinced that either measure will be detrimental, resistance should be carried to the utmost, or until importunity on the part of those who have authority assumes the form of *command*. "In yielding contrary to his judgment, the physician should distinctly throw all responsibility on the applicant; otherwise, the consequence, if injurious, will certainly be cast on him." (BURROWS.) I would add, that the commands of the friends, in such circumstances, should be required to be made in writing; as they will be much more cautious than otherwise in thus making them, and as evasions of responsibility will often be attempted, in this as well as in many other matters, when there is no written document to prove its existence.

515. Before permitting the visit of any person, the state of the patient's feelings and views to that person should be ascertained. It will be also preferable to select for the first interview some one who the least interests the patient's affections; and, if this communication is borne without any ill effect, a nearer friend or relative may be selected, leaving the object of warmest attachment to the last. Proceeding in this cautious way, Dr. BURROWS remarks, the too sensitive or feeble mind is gradually brought to bear a renewal of intercourse without being too much moved. But the physician might be deceived by the dissimulation of the patient, who will often assume an appearance of amendment merely to obtain an interview with a friend, his only object in seeking it being to request his release, or to complain of his treatment.

516. Cunning being a characteristic of madness, the physician should always be upon his guard against being imposed upon. Many are fully aware that, if they can conceal their delusions, they may be considered well; and, when only one delusion is entertained, it is often difficult to detect it. Dr. BURROWS had a patient whose specific delusion gave rise to outrageous conduct requiring her confinement; and yet this delusion was successfully concealed for nine months, at the end of which time it was manifested in an alarming manner. In this and similar cases, a recovery might have been prematurely or improperly pronounced. On the other hand, it is possible for an impression, made previously to complete mental derangement, to be so firmly retained after recovery as to have the semblance of a delusion, and yet be none; especially when no recollection is retained of what has occurred between the accession of disorder and recovery, and when the patient reasons and acts upon this conviction, and reckons a circumstance long passed as having recently taken place. Much discrimination and experience are necessary to determine when seclusion may be terminated, and the patient restored to society. If the disorder have been caused by intemperance, a longer confinement after convalescence is required than in other circumstances; for the longer it is protracted, the greater is the chance of the patient being induced to relinquish a recurrence to the cause.

517. *h. After the patient is restored to society*, moral and hygienic management ought to be continued for a considerable period. Due care should be taken not to excite, or inordinately indulge the passions and desires. Irritations of mind and body should be avoided, and all emotions which depress, equally with those which unduly stimulate the mind, ought to be evaded. Mental exertion is also injurious. The intellectual as well as the moral powers should not have too much imposed upon them. They ought, at first, to be only agreeably and gently exercised; and, as they re-acquire strength, more may be exacted from them. Travelling, agreeable society, change of scene and of air, regular and early hours of sleeping and dining, pleasant occupations, and exercise in the open air, are all of the most essential service after recovery. Of no less importance are regular and abstemious modes of living, and strict attention to the states of the digestive and excretive functions. In a word, the *predisposing* and *exciting causes* ought to be carefully avoided.

518. iv. CLASSIFICATION OF PATIENTS, AND ARRANGEMENT OF INSTITUTIONS, &c.—*A. The classification of the insane*, in both public and private asylums, is too frequently dependant upon their extent, and upon subordinate circumstances and arrangements, instead of these being made subservient to a classification which may contribute to the safety and speedy